The
Electrical Review

Vol. CXI. SEPTEMBER 30, 1932. No. 2862.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "Agekay, Cent, London." Code, A B C. Telephone No.: Central 5871 (5 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

Subscription Rates, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to E.R. (1930) Ltd., and crossed "Lloyds Bank."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

Principal Contents:

	PAGE
Clearing the Air	453
Developments at Grimsby	456
The Electrical Propulsion of Aircraft	457
A Large Cinema Installation	458
Electricity in the Tannery. By P. I. Smith	459
Earth Resistances. By G. F. Tagg	460
Electrical Blast Furnace Plant. By C. H. S. Tupholme	461
Conductor Temperature Measurement	462
Feeder Earthing Devices	463
The Oil-pressure Circuit Breaker	464
Correspondence: Beauty and Utility; Waste Insulating Materials; Electric Motors for the Farm; A Correction	465
New Apparatus and Devices	467
A.C. Commutator Motors	470
The Copenhagen Exhibition	471
Overhead-line Terminal Boxes	473
Business and Industrial Notes	474
Electricity Supply	478
Traction	480
Communications	480
Contract Information	481
Notes	482
Our Personal Column	483
New Companies Registered	484
Returns of Electrical Companies	484
City Notes	485
Stocks and Shares	485
Published Specifications	487
New Work for Contractors	488

Clearing the Air

THE National Smoke Abatement Society decided last week-end at Newcastle-on-Tyne that one good way of combating the widespread evil was to work through the teaching profession. This is appropriate, as children are the greatest sufferers from atmospheric pollution, which fosters the respiratory diseases that are the greatest source of infant mortality and causes many ailments due to lack of sunshine and ultra-violet rays.

But the real reason for instructing children in the bad effects of smoke is to cause them to grow up with an intention of taking action to get rid of the nuisance. We have known for centuries the toll it takes of lives and property. As long ago as 1661, John Evelyn in his "Fumifugium" was saying substantially what is being said to-day, and the editor of the 1772 edition of the work deplored the loss of child life then, and even suggested a Government inquiry into the possibility of the pre-treatment of coal.

In those days the chief offender was industry, now it is the domestic hearth, as this is responsible for about 70 per cent. of the smoke produced. The coal fire is admittedly very cheerful, but it is a luxury—or perhaps a vice—for which we pay heavily, when all the time there is an endless variety of electric fires available.

We each of us consume some seven times as much air by weight as we do food and water, and one-eighth of our population dies annually from causes traceable to impure air. Every ton of coal burned does damage to the extent of ten shillings; the soot deposited per annum at seventy official testing stations varies from 100 to 300 tons per square mile, most of which is produced between 6 a.m. and midnight.

Apart from these material losses there are the indirect influences of a smoky atmosphere. It was suggested at Newcastle that the grime of our industrial towns was responsible for an inclination among some men to regard their work not as a main interest in life, but merely as something that provided money to enable them to get away from it; they had come to look upon the dirt and grey skies as an industrial necessity.

It was also stated at the Conference that the most active part in the prevention of smoke was played by the owners of large steam plants with a view to reducing fuel consumption, but that with the smaller plants little improvement was taking place. The remedy is clearly for the latter to buy their power as electricity from the former.

Efficient flue gas purification is much nearer accomplishment—on obvious grounds—in bigger stations than in smaller ones. Moreover, the high thermal efficiency and the concentration of combustion in suitable places, which is made possible by the large electric generating station, causes a very great reduction in the total amount of atmospheric pollution.

The basic solution of the smoke problem is to use electricity not only in the home, but for motive power, and in the vast field of industrial heating also. And it is not only instruction of what to avoid in some undefined way that can be given to the coming generation. A more positive way, and one much more likely to be fruitful, is the plan of the Electrical Association for Women to teach children to become electrically minded.

Cooker Campaigns

GREAT activity prevails amongst the gas people in the United States at the present time. Earlier conception of the situation there was that electricity had made greater headway than here, because gas was not entrenched as it was in this old country when electricity was being introduced fifty years ago. To-day, however, judging from editorial remarks appearing in an American electrical contemporary just to hand, the gas people are dealing—well, not exactly a knock-out blow to, but a strong competitive attack upon, the electric range interests. It seems that eighteen months ago a campaign was started with the determination to sell 1,000,000 electric ranges in three years, but "the industry as a whole . . . declined to become excited," and the movement has been just kept alive by a small group of manufacturers and utility men. Now there comes the response of the gas men! They are embark-

ing upon a three-year gas cooking and range-promotion campaign. Eighty-one manufacturers will contribute about $5,000,000 by paying 5 per cent. on their current net billing up to $2,000,000 a year. The advertising campaign, which starts next February, will pay $1,500,000 for newspaper and magazine advertising to boost automatic gas cooking and to stress complete insulation and cool kitchens. Against this has to be set the figure of $75,000, the total so far promised by the electric range people—with the risk, as our contemporary suggests, of cooking business becoming the industry's step-child and nothing more. But let us be perfectly clear that we are qualified before we in this country "cast the first stone"!

A Friendly Market

NEXT to the Dominions we suppose that Denmark is our closest commercial friend. It is probably the only foreign market in which there is a definite desire to "Buy British," and the latest trade figures indicate that that desire has been translated into action, for Denmark's imports from Great Britain show a marked increase. This predilection for British goods is now being actively fostered by 500 British firms at Copenhagen, and, as we show on another page, electrical manufacturers are among this number. The British Exhibition in that city is attracting very large numbers of Danish people who will be enabled to see exactly what this country has to offer them. A notable feature of the display is the evidence that British manufacturers have made a real endeavour to meet Danish requirements, which are not always in line with British practice. The British electrical industry is very much to the fore in Denmark—as witnesses the recent supply of plant for the Copenhagen municipal station and rolling stock for the electrified suburban lines of the capital city—and in such a progressive country there must be a good many openings for British electrical goods. The exhibition should, therefore, be productive of good results; indeed, these are already becoming apparent according to the latest reports.

A Victory for the Trolley-bus

WE have often deplored the substitution of the petrol bus for the tramcar in some of our cities—not because we believed that the tramcar afforded the best means of public transport in most of such cases, but because not enough consideration appeared to have been given to the merits of the trolley-bus. At Wolverhampton the trolley-bus has been given a fair deal with very gratifying results. The tramways were abandoned in 1928 in favour of the trolley-bus. But not only that: six miles of petrol-bus route also has since been converted to trolley-bus working, and we learn from Mr. C. Owen Silvers, the general manager and engineer of the Transport Department, that a further six miles is being changed over. At present forty miles of trolley route is being operated, not in order to provide a load for the Corporation's electricity undertaking or for any sentimental reason, but because experience gained in the working of the two systems side by side has proved conclusively the quite definite economy, as well as the superiority, of the electric vehicle.

"Economy" and its Effects

MUCH harm is being done to-day by the pursuit of what is falsely termed "economy," that is, the saving of money regardless of the consequences. It is obvious that an individual could save a good deal of money by going without food, but the ultimate effect would not be to his advantage. Under schemes of economy the building industry is being starved; housing schemes are being slowed down or suspended (although cinema building seems to be going ahead pretty strongly). The result is that thousands of workers in the industry and in others which are very largely dependent upon it have been thrown out of work, with a consequent shrinkage in their purchasing power, which must have its repercussions all round. As the Building Industries Conference has shown in a memorandum submitted to the Government Local Expenditure Inquiry Committee, "for every £1,000,000 of building work abandoned the State or local authorities would be called upon to bear an unproductive expenditure of £375,000 in unemployment benefit and public assistance, while a further £425,000 would be withdrawn from the purchasing power of the wage earners." We are concerned in this matter, for nowadays practically every building scheme means work for the electrical contracting industry, and when these schemes are stopped not only that section, but electricity supply authorities and manufacturers too are adversely affected. We claim that such work is essential and productive, and should not be lightly abandoned.

A Plea for Poles

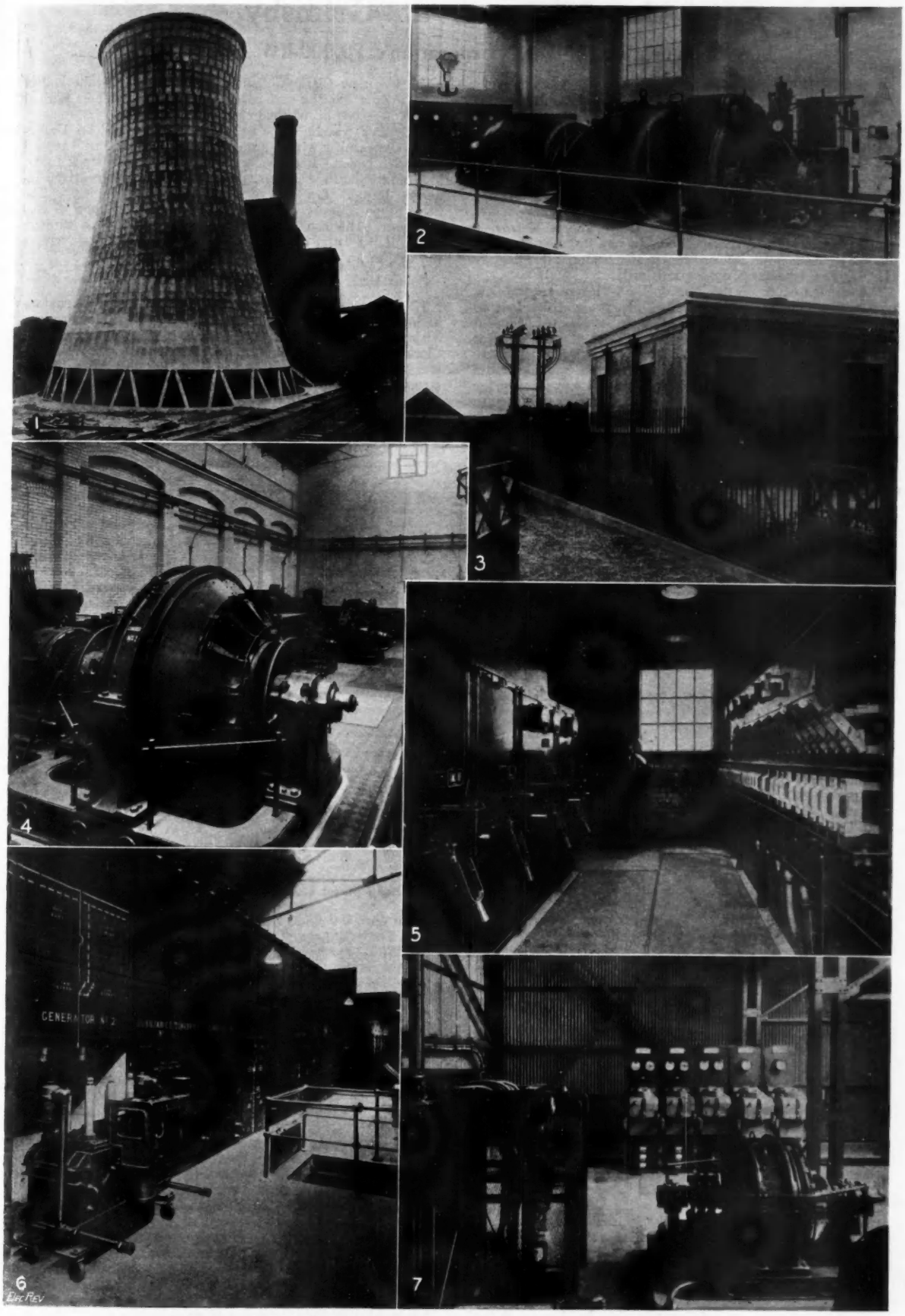
WHILE we won't pretend to believe that pylons, pillars and poles enhance the beauty of a landscape, or add to the attractions of an old-world village, we must say a word for the rural supply companies which a correspondent attacks in this issue. In the first place he refers to ugly poles and sagging wires, but those distribution systems which we have encountered are not like that. In general the wires are as taut as possible, the poles are straight, and on the whole they are inconspicuous and neat. We agree that they are not beautiful, but they are playing a part in beautifying the lives and homes of dwellers in these old-world villages, which are not so romantic inside as they appear to the idle eye of the visitor. And, after all, they form a very unobtrusive background to the stream of motor traffic, the filling stations, and the "olde tea shoppes" which are the most prominent features of some of our old-world villages.

Overhead Lines

IT was stated at the opening meeting of the Overhead Lines Association last week that a small rural undertaking in the North of England was being obstructed by the County Council in carrying out its distribution scheme. The County Council's objection was to the use of 11-kV overhead lines, which were already erected. The latter body surely has no right of veto in the matter; it merely has to right to lodge objections with the Minister of Transport before he gives his consent to the erection of the line, as Mr. Fennell pointed out. The main purpose of the Association is to help those concerned in the distribution of electricity by overhead lines, and any undertaking encountering this problem or obstacles of a kindred nature should adopt Mr. Brooking's advice and communicate with the Association immediately.

The Coming I.E.E. Session

THE programme of the first half of the 1932-33 session of the Institution of Electrical Engineers covers a wide range of subjects that are of current interest. At the first ordinary meeting after the presidential address (which Professor Marchant will deliver on October 20th), Mr. A. B. Read and Dr. J. W. T. Walsh will present a paper on the inexhaustible subject of the lighting of buildings. A fortnight later Mr. R. P. Smith will deal with a matter whose interest should not be confined to communication engineers, *viz.*, the introduction of modern machinery and methods in the inland telegraph service. Some much-wanted information on a vexed question—the relative economy of electricity, gas, oil, and solid fuel—may be expected from Mr. Barker's paper. The Institution of Mechanical Engineers, and the Institute of Fuel will join with the "Electricals" for the last meeting before Christmas, when Messrs. C. H. Davy and C. H. Sparks will discuss post-War developments in high-pressure boilers. Only one paper has yet been arranged for the New Year; that is one by Mr. I. Ofverholm on the economic problems of the Swedish State Railway electrification, from which we hope to learn much that is pertinent to the position in Great Britain.



The Grimsby Undertaking which has been extended by 10,000 kW.

1. The ferro-concrete cooling tower and railway siding. 2. The new 10,000-kW turbo-alternator. 3. The Holton-le-Clay sub-station and the 22-kV line to Louth. 4. The Moss power-house sub-station. 5. The interior of the Highfield sub-station. 6. The refitted switchgear cubicles; K3 circuit breaker withdrawn. 7. A corner of the West Marsh sub-station.

Developments at Grimsby

The inauguration of the Corporation's 10,000-kW extension

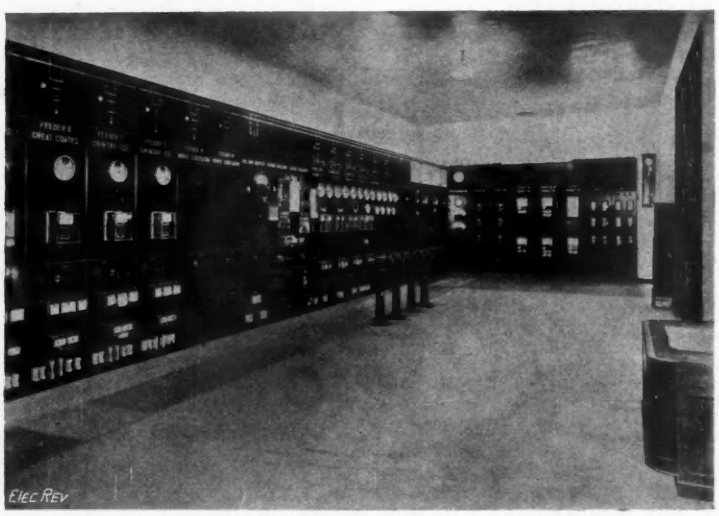
A SECOND 10,000-kW (m.c.r.) set was officially inaugurated at Moss Road power station on Wednesday by Mrs. Thickett, wife of Ald. W. H. Thickett, J.P., chairman of the Grimsby Electricity Committee. The first unit of this size was installed in 1929 and the capacity of the station is now 25,500 kW.

The new turbine is similar to the earlier 10,000-kW set, running at 3,000 r.p.m. with steam conditions of 125 lb. per sq. in. and 650 deg. F. It consists of a velocity-compounded stage followed by fourteen impulse stages and a Metrovick duplex multi-exhaust. Steam is bled at one l.p. stage to raise the temperature in an integral feed water heater to 150 deg. F. at 8,000 kW (the most economical load).

The condenser is of the Metropolitan-Vickers central-flow type with a cooling surface of 12,850 sq. ft., and designed to maintain duty with 10 per cent. of the tubes blanked off when supplied with 11,750 gal. of circulating water per min. at 75 deg. F. Circulating water is drawn from the cooling towers by a common bus-main and discharged into a common outlet main; duplicate 155-h.p. cooling water pumps, one a.c. and the other d.c., are installed. The condensate extraction pumps are also in duplicate, a.c. and d.c. driven.

One of the cooling towers (erected in 1929 by the Davenport Engineering Co.) is of the "Bradford" timber type and reduces the temperature of 220,000 gal. of cooling water per hour by 17 deg. F. Its height is 70 ft. above ground level. The second tower, erected by F. Mitchell and Sons, Ltd., is of the Mouchel type, consisting of a wooden framework housed in a reinforced concrete chimney that is circular in plan and hyperbolic in elevation. It is designed to cool 450,000 gal. per hr. from 95 to 75 deg. F. when the wet bulb thermometer is at 52 and the relative humidity of the air 80 per cent. The tower is 100 ft. high and has a maximum diameter of 80 ft.

The 12,500-kVA (0.8 p.f.) alternator generates at 6,000 to 6,600 V. It is cooled on the closed-circuit system with fans mounted at each end of the rotor shaft. The main exciter is excited from an auxiliary permanent-magnet dynamo driven at slow speed from the turbine governor spindle.



The new control room at Moss Road power station

Switchgear and Control Room

The alternator switchgear (K3 type) has a rating of 1,800 A and a rupturing capacity of 350,000 kVA. The current transformers, of the bushing type, are mounted on a common primary; the voltage transformers are of the plug-in type with current-limiting resistances and high- and low-voltage fuses mounted in the tank. Overload and Merz-Price protection is employed.

The switchgear supplied with the earlier 10,000-kW alternator was similar, but that for the 2,500 and 3,000-kW sets was of the cellular double bus-bar type. The latter has now been reconstructed for 350,000 kVA, the larger breakers being fitted into the existing cubicles. The new busbars, each of 3 sq. in. section, are supported on porcelain insulators. Pole-operated single-pole isolators are fitted and the usual interlocking safety devices are employed. A new control room has been constructed on the first floor of the building extension. The control board comprises forty-two slate panels; twenty-two by the Metropolitan-Vickers Electrical Co. control the four alternators, two voltage regulators, thirteen feeders, synchronising and earthing apparatus, and to couple the bus-bars. B.T.-H. panels control the 33-kV panels from the grid lines (which are looped in from Lincoln and Hull), and thirteen Met-Vick panels the 6.6-kV side of the Central Board's transformers, metering and summation. These twenty panels belong to the Central Board. The control-room operators are able to overlook the turbine room.

The two new Clarke-Chapman five-drum water-tube boilers have each a heating surface of 11,000 sq. ft. Their normal output is 60,000 lb. of steam per hr. (maximum 75,000).

A Green's tri-tube 3,360 sq. ft. economiser and an Underfeed louvre stoker with a grate area of 330 sq. ft., are supplied with each boiler. Each boiler has a separate steel stack 120 ft. high and 7 ft. in diameter, provided with a motor-driven induced draught fan and a Davidson dust catcher. The bucket-type Bennis conveyor will handle ten tons of coal per hour. The ash is discharged from the grates through chutes into a water trough, and an Underfeed conveyor scrapes the ash to an outside dump.

The Contractors

The contractors for the extensions were: turbo-alternators, high-voltage switchgear and controls, the Metropolitan-Vickers Electrical Co., Ltd.; steam-raising plant, Messrs. Clarke, Chapman & Co., Ltd.; cooling tower (reinforced concrete), Messrs. F. Mitchell & Son, Ltd.; cooling tower (timber structure), the Davenport Engineering Co., Ltd.; coal-handling plant, Messrs. Herbert Morris, Ltd.; buildings, foundations, reinforced concrete work, &c., Messrs. J. H. Thompson and Son, Ltd.; structural steel work, Messrs. T. W. Ward, Ltd.

The plant for which Messrs. Clarke, Chapman & Co., Ltd., were responsible included: economisers by E. Green & Son, Ltd.; superheaters by the Superheater Co., Ltd.; firing equipment and ash conveying plant by Underfeed Stoker Company, Ltd.; coal elevators by Edward Bennis & Co., Ltd.; fans and grit collectors by Davidson & Co., Ltd.; steel chimneys by the Workington Bridge and Boiler Co., Ltd.; brickwork by Poulton and Sons; and instruments by the Electroflo Meters Co., Ltd.

The whole of the work was carried out to the specification and under the supervision of Mr. S. R. Windle, M.I.E.E., M.I.Mech.E., chief engineer and manager, whose portrait appears on page 483.

The Grimsby undertaking covers 325 sq. miles in the Mid-East England Area of the grid scheme. Three-phase energy at 6.6 kV, 50 cycles, is transmitted to forty-two sub-stations, transformed to 400/230 V and distributed on the four-wire system. There are also three rotary convertor installations totalling 6,750 kVA, which provide nearly half of the 460/230-V d.c. supply, the balance being supplied from the power station.

Cables (330 miles) are everywhere used, except for the 22-kV line to Louth. Low-voltage distributors laid during the past few years incorporate a fifth core for the group control of street lighting. Direct labour has been employed for all cable laying since the original installation was commenced in 1900.

Rapid Progress

Load building has been very rapid lately, the number of consumers (13,084) having increased by 92 per cent. since 1928 and the kWh sold (21.76 million) by 5 per cent. This is a remarkable development in view of the predominantly agricultural character of the district, apart from the ports of Grimsby and Immingham, and the town of Louth, to which a bulk supply is given. The Cleethorpes undertaking also purchases its supply in bulk from Grimsby. Other large consumers include the Corporation Tramways, the Grimsby Ice Co., Ltd. (said to be the largest ice factory in the world), the Standard Ice Co., Ltd., several fish-meal, fish-manure, twine-spinning, net-making, waterproofing, and engineering firms, and the Admiralty wireless station at Waltham and the "Empiradio" station at Tetney (transmitting to India and Australia.

Electricity is available at almost all premises within a ten-mile radius of Grimsby and is used extensively for heating incubators and brooders; some dairy farms are completely electrified, and further developments are expected shortly.

The Electrical Propulsion of Aircraft

A SCHEME of electrical propulsion, analogous to the systems used on shipboard, offers attractive possibilities in relation to aircraft, and the basic factors in such development were discussed at length by R. Jacquot in a recent issue of *Revue Générale de l'Electricité*.

The increasing size and power of modern aircraft brings electric traction in the air well within the bounds of possibility and, to the electrical engineer at least, a Diesel-electric generating set in the hull with simple circuits to polyphase squirrel-cage motors on the propeller-shafts, appears to offer many advantages compared with purely mechanical, multi-engined arrangements.

Theoretically, it is possible to use d.c. propeller motors with storage batteries for energy supply in flight, but the weight of the batteries would be excessive for flights of considerable duration. The addition of a d.c. generating set would simply add to the weight and complexity of the equipment, and the use of d.c. motors with brush gear would sacrifice the inherent simplicity and lightness of the squirrel-cage motor.

Adoption of D.C. Improbable

From every point of view, there is little probability of the d.c. system being adopted on aircraft, but the three-phase a.c. system combines the advantages of simplicity, lightness and reliability. Mr. Jacquot says that the frequency corresponding to minimum total weight of equipment ranges from 75 to 200 cycles per sec., the weight per effective h.p. being then comparable with that of the power system in existing aircraft. The weight of 1¾ to 2 lb. per h.p. sometimes cited for petrol aero engines is generally based on the maximum bench h.p., and does not include pipes, radiator, water and oil. It is suggested that the weight of the complete petrol power plant, as entering into the present comparison, may be nearer 4 lb. per effective h.p., and this figure could be closely approached by a petrol- or Diesel-electric installation with eight electrically driven 400-h.p. propellers.

Electrical equipment designed specifically for air service could safely be rated much more highly than standard industrial equipment, and the frequency of supply would not be subject to the same restrictions. The cost of special laminations and insulation to permit of high flux densities and high operating temperatures would be small compared with the special expenditure on aero engines. The propeller motors could be of the " rotating stator " type, with the propeller blades attached to the " stator " and acting as cooling fins.

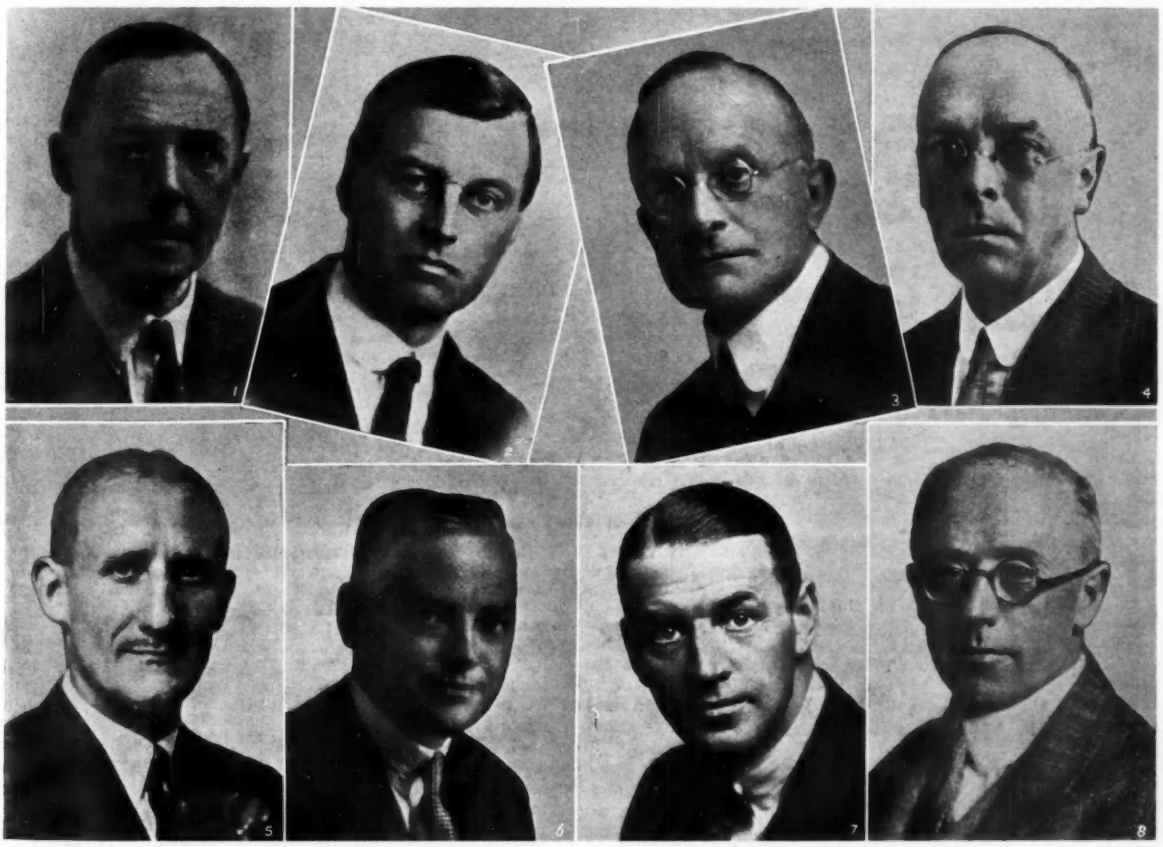
A motor of ordinary industrial construction could be reduced 20 per cent. in weight per h.p. by being operated at a maximum temperature of 200 deg. C.; 15 per cent. by structural modifications and simplification; and 25 per cent. by the use of light-metal alloys for structural components, thus effecting a total saving of 50 per cent. By increasing the frequency of supply the speed and power could be increased in the same ratio, thus reducing the weight per h.p. to one-fourth or one-sixth that of a standard industrial machine.

Comparative Weights

Mr. Jacquot estimates that the weight of a main engine, 150-cycle alternator and squirrel-cage motors for driving eight 400-h.p. propellers at 1,500 r.p.m. would be approximately as follows:—3,750-h.p., 3,000-r.p.m. engine, 4,134 lb.; six-pole alternator (half the weight of commercial designs), 4,961 lb.; eight 400-h.p., 12-pole squirrel-cage motors (half the weight of commercial designs), 11,025 lb.; total, 20,120 lb., or 6.28 lb. per h.p., a figure which approaches practical requirements and could certainly be reduced. The allowance made for the weight of the engine, for example, is excessive, a modern 1,900-h.p. aero engine weighing about 0.8 lb. per h.p.

Thus it is possible to deduce many advantages for the electrical system; they are, at least, sufficiently reasonable and important to merit practical trial. The overall efficiency of the Diesel-electric system should be no lower than that of a multi-engine installation, and would possess important advantages in simplicity and flexibility of control.

The modern petrol-driven aeroplane is a reliable machine but serious accidents still occur from defects which are trivial in themselves, and it certainly appears that many of these could be avoided in a Diesel-electric machine with electrical transmission and driving. It will not be surprising if the commercial aircraft of the future is operated on this principle, and the field is one of great potentialities.



Some Driving Forces in the Industry: Lancashire Dynamo & Crypto, Ltd.

1. Mr. G. E. Mason (*J. Ingham & Sons*), director, Trafford Park Works. 2. Mr. A. P. Wood (*J. Ingham & Sons*), joint managing director, Trafford Park Works. 3. Mr. J. G. Shaw, joint managing director, Willesden Works. 4. Mr. C. R. Shaw (*Jerome, Ltd.*), director, Willesden Works. 5. Mr. J. H. Dunbar (*Lafayette*), director and secretary, Trafford Park Works. 6. Mr. J. W. Howard (*J. Ingham & Sons*), chief engineer, Trafford Park Works. 7. Mr. A. P. Davis (*Basil*), export manager, London office. 8. Mr. H. W. Bosworth (*Lafayette*), joint managing director, London office.

A Large Cinema Installation

An Eccles theatre which has a connected load of 262 kW

THE new Broadway Theatre at Eccles provides seating accommodation for 2,500 persons as well as lounges for the stalls, circle and balcony. A café above the foyer is capable of holding 300 people, and includes a bandstand and dancing floor.

The interior decorations are original, consisting mainly of stencilled designs on a plastic paint surface textured in various forms. Most of the textured surfaces are sprayed lightly with silver or gold finish, and provide a very pleasing effect under the coloured lighting, which is used throughout the theatre.

The Electricity Supply Arrangements

The 3-phase 50-cycle supply for the connected load of 262 kW is taken from the sub-station in the basement of the Eccles Corporation electricity offices by a separate 400-V feeder. The main switchboard comprises a 500-A three-phase and neutral circuit breaker feeding a three-pole and neutral bus-bar chamber, from which the local circuits are taken. Two main four-core p.i. cables run from this chamber through a 300-A air-break three-pole and neutral switch-fuse to the stage and projection room respectively.

The boards for switchroom, stage, and projection room are all ironclad on angle-iron frames with provision for accommodating the Corporation meters on sheet-iron panels. The multiple-way switch box controlling local lighting—other than that in the theatre itself—is constructed in the form of a sheet-steel cubicle with removable back and front, carrying sixty 20-A Wandsworth radiator-type steel and mica tumbler switches lettered on the face panel for the different circuits.

The stage equipment consists of three 60-ft. battens, footlights on the orchestra lift front, and nineteen 1-kW balcony front floods, all controlled from a stage dimmer panel with "colour-master" and "grand-master" controls. For distribution at this point a three-pole and neutral bus-bar chamber is provided and is mounted along with other ironclad gear at the side of the stage-control board.

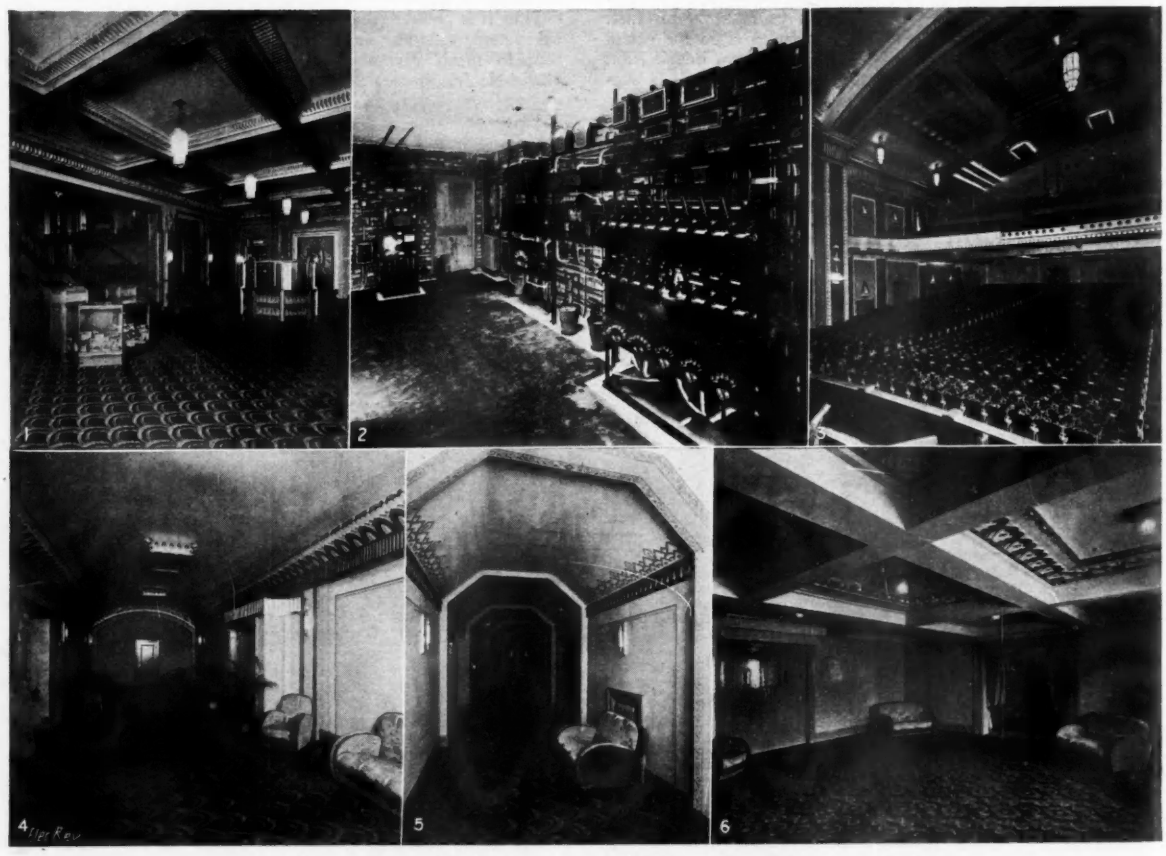
The projection-room board consists of a bus-bar chamber feeding various local circuits, including two 100-A mercury-arc rectifiers controlled by an automatic device constructed by Messrs. W. H. Smith & Co., who were responsible for the supply and erection of the entire electrical equipment of the building, and arranged so that the second rectifier automatically comes into operation at 105 A and goes out at 95 A. The order in which the machines take the load can be changed by a simple movement of a switch. Two 12-in. sector-type illuminated meters on this board show the current and voltage for the rectifier circuit, and figured neon pilot lamps indicate which machine is on load. The board also incorporates an eighteen-way radial-stud dimmer bank for auditorium lighting, and radial stud arms for projector and spot arc resistances.

The proscenium architrave and semi-circular cove are both flooded with light from red, blue, and green sprayed lamps in metal reflectors. The main grilles and stepped ceiling over the balcony are treated in a similar manner with blue and amber sprayed lamps. The main and minor auditorium fittings are fitted with amber lamps, with red and blue on a separate cornice above connected to independent dimmers for variation in colour and intensity on the raised surface of the stencil over the main fitting.

Auxiliary Services

The orchestra and organ lifts are of the screw-jack type operated electrically, and the three-manual organ is of the electro-pneumatic pattern. A fully automatic telephone system has been installed for intercommunication, and the equipment includes a battery of Chloride cells with a "Keepalite" panel for general illumination in the event of failure of the outside supply.

The following firms supplied materials or constructed gear to the specification of Messrs. W. H. Smith & Co.: main circuit-breaker and bus-bar chamber, J. G. Statter & Co., Ltd.; main switchgear and distribution boards, the Vincent Switchgear Mfg. Co., Ltd.; conduit and cables, the General Electric Co., Ltd.; local switches, the Wandsworth Electrical Co., Ltd.; stage equipment, the Strand Electrical & Engineering Co., Ltd.; mercury-arc rectifiers, the Hewittic Electric Co., Ltd.; automatic telephones, the Reliance Telephone Co., Ltd.; auditorium dimmer bank, Holophane, Ltd.; fittings, Hailwood & Ackroyd, Ltd.; projector and spot resistances, Austin Walters & Son, Ltd.; instruments, the Record Electrical Co., Ltd.



Some views of the interior of the Broadway Theatre, Eccles

1. The foyer. 2. The main switchboard, giving an idea of the magnitude of the electrical load. 3. A view of the auditorium from the stage, showing the battery of balcony floodlights. 4. The lower floor promenade in which box type ceiling fittings are employed. 5. The balcony promenade. 6. The balcony lounge.

Electricity in the Tannery. By P. I. Smith

Reliability under severe conditions

THOSE who consider the leather industry backward in electrical development should visit the all-electric tannery of Messrs. A. G. Jones & Co., Ltd., Derby, where 1,500 dozen glacé kid and some hundreds of dozens of sheepskin leathers are produced per week.

The chrome tan house: two Crompton motors working in very difficult surroundings

The total number of motors in the Slack Lane factory is forty-four with an aggregate horse-power of 617. The consumption of electricity for lighting and power is about 460,000 kWh per annum.

Goatskins for glacé kid are completely dressed in a spacious new building equipped with up-to-date machinery. On the ground floor of this three-storey plant are eighteen wooden drums, eleven paddles, five striking-out machines, two fleshing, and one painting machines, all driven by three 50-h.p., 3-phase, 50-cycle, 300-r.p.m., slip-ring Crompton-Parkinson motors. The starting apparatus is by Geo. Ellison, Ltd.; all the high-powered motors in the factory are provided with the same make of starter.

The goatskins utilised for glacé kid are obtained from India and they are delivered at the tannery in large canvas-covered bales. After careful sorting for size and quality the sun-dried skins are soaked in cold water until thoroughly softened. The hair is removed by first painting the flesh side with a depilatory; a specially adapted machine is used for this purpose. The skins are afterwards limed in paddles, requiring about 2 h.p. each, and then fleshed by machine.

Atmospheric Conditions

The air in the wet departments is always damp and usually contains corrosive vapours and gases, but the works engineer states that since the factory was erected in 1919 there has not been a single breakdown. He ascribes this freedom from stoppages to careful maintenance of the motors, which are protected with Griffiths's anti-sulphuric acid enamel. The motors are fixed on concrete blocks about 2½ ft. high and thus escape flooding by the overflows of liquors from paddle wheels and drums.

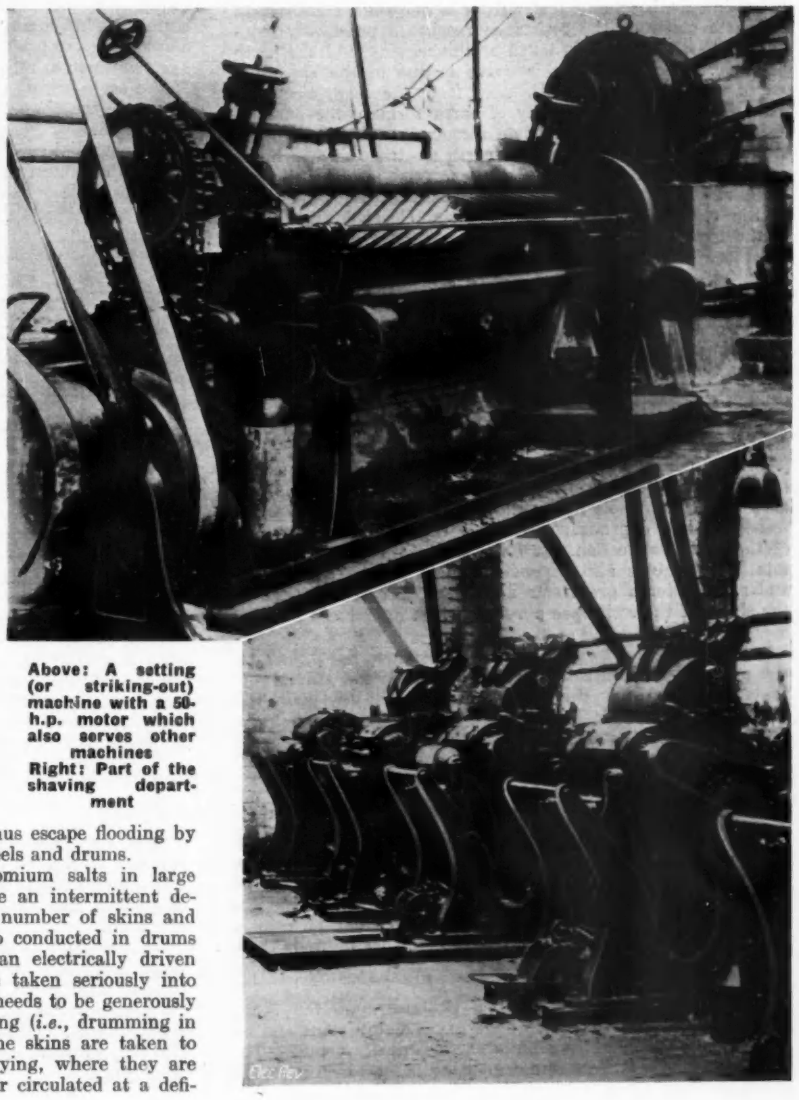
The goatskins are tanned with chromium salts in large wooden drums or tumblers which make an intermittent demand of 4 to 6 h.p., according to the number of skins and volume of liquid inside. Dyeing is also conducted in drums with intermittent loads. In planning an electrically driven tannery the intermittent load must be taken seriously into consideration and the maximum power needs to be generously estimated. After dyeing and fat liquoring (*i.e.*, drumming in various oil emulsions) are completed, the skins are taken to the second floor of the building for drying, where they are hung on racks and exposed to warm air circulated at a definite speed by a powerful electrically driven suction fan. The drying operation is most carefully controlled by automatic temperature and humidity indicators.

The Cumberland electrolytic process is used for the prevention of scale in the boilers required for the production of process steam. Each boiler contains three insulated bars taking 15 A per bar at 10 V. The cost per hour works out at less than ¾d. which the engineer considers is more than justified by the saving effected in fuel and also in time and money spent to chip the boilers, as the feed water is generally considered the hardest in the county and Derbyshire water contains a very high percentage of temporary hardness salts.

When thoroughly dry the leathers are taken down by lift to the first floor for finishing. This storey holds a large number of small machines for glazing, staking, setting, seasoning, and shaving, each requiring from ¼ to 5 h.p. A 50-h.p. Crompton-Parkinson motor drives all the machinery on this floor with the exception of a measuring machine served by a ¼-h.p. motor; the latter machine complies with the weights and measures standards of the Board of Trade, and the skins are accurately measured in square feet and inches.

Pigment Spraying

The spraying of pigment finishes is an established process in the leather industry and Messrs. Jones have several up-to-date spraying rooms. One which I visited was equipped with five spray guns served by a 5-h.p. Verity motor driving an air compressor. The glacé



Above: A setting (or striking-out) machine with a 50-h.p. motor which also serves other machines
Right: Part of the shaving department

Earth Resistances. By G. F. Tagg, B.Sc., A.M.I.E.E.

The potential gradient in the surrounding soil

AN earth plate of low resistance may have a high potential gradient, while an earth plate of high resistance may have a low potential gradient. This is due to the dependence of the resistance on two factors, the dimensions of the earth plate and the specific resistance of the surrounding soil, while the potential gradient depends on one factor only, the dimensions of the earth plate.

The variation of resistance with distance from the earth electrode has been found to be of the form shown in fig. 1. The resistance increases with distance, but the rate of increase

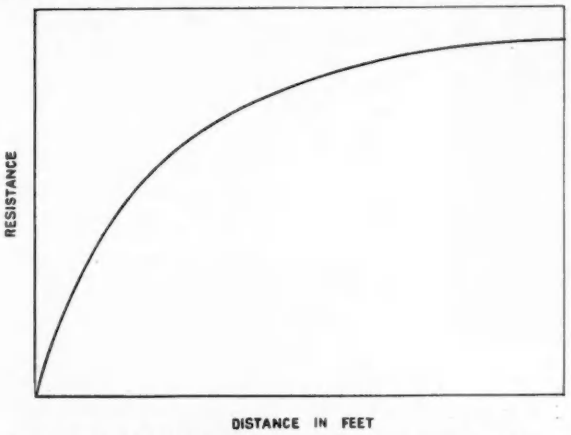


Fig. 1.—Typical resistance-distance curve for an earth electrode

is continually becoming less. After a certain distance from the earth electrode the resistance reaches a practically constant value; this value is taken as the resistance of the earth electrode. The form of this curve is due to the spreading out of the current in all directions from the earth electrode, with the result that the body of earth forming the effective resistance of the earth electrode surrounds it in the form of a bowl. The distance from the earth electrode at which the resistance becomes practically constant, and also the slope of the curve in fig. 1, are determined solely by the dimensions of the electrode. Hence, for a given electrode the shape of the curve is always the same, irrespective of the specific resistance of the soil in which it has been buried.

Calculating the Distribution of Resistance

This can be shown in another way. The approximate distribution of the resistance round any electrode may be calculated approximately by replacing the electrode by a hemisphere having the same total resistance. Then up to a distance r_1 from the electrode the voltage drop $= V\tau \frac{1}{\tau} - \frac{1}{r}$ where V = the voltage drop between the electrode and the main body of the earth, and τ = radius of an equivalent hemisphere.

This is independent of the specific resistance, and thus the ratio of the voltage drop up to any given point to the voltage drop across the whole resistance is independent of the specific resistance and depends solely on r, that is, the dimensions of the earth connection. It follows that the fraction of the total resistance is also dependent solely on the dimensions, and so that for a given size and shape of earth connection, the shape of the resistance curve which is reproduced in fig. 1 is the same.

The curve in fig. 1 represents, in addition to the resistance, the potential difference between any point in the ground and the earth connection; the slope of the curve at any point will give the potential gradient at that point. This potential gradient will also be dependent solely on the dimensions of the earth connection. This presupposes a dead earth in the event of a fault, as it has been assumed that the total voltage between the electrode and the main body of earth is the same in all cases.

For a fault which is not a dead earth, these considerations will be somewhat modified, as there will be two resistances to earth and the voltage across each will depend on their respective resistances. Unless the specific resistance of the earth is the same at the point where the fault occurs and at the earth electrode, this specific resistance will play a part in determining the total potential across the earth connection and thus the potential gradient, but the dimensions of the earth electrode will still be the most important factor in determining the potential gradient.

The greater the dimensions of the earth connection the less rapid will be the increase of the total resistance with the distance from the earth connection. This means that the slope of the curve will be less the larger the dimensions of the earth electrode, and that the potential gradient will also be less.

An example of an earth connection with a steep resistance curve is given in fig. 2. The full curve in this figure is the earth resistance curve of a single spike, some 4 ft. long and 1¼ in. in diameter. The total resistance of this spike is just over 16 ohms, and is reached at a distance of about 30 ft. At a distance of 2 ft. from the spike the resistance is already 11.5 ohms, or 72 per cent. of the total. In the event of a fault and a high potential to earth, anyone standing near the spike and touching it might receive a severe shock.

A Special Protective System

The system which is earthed to this spike is fitted with a special type of protection, so that if the earth conductor is raised to a potential of more than about 40 V above earth, the main switches are tripped and the supply disconnected. For a system not so protected, this single spike would not be a very effective earth as regards either resistance or potential gradient. If the earth resistance curve were of the form shown dotted in fig. 2, the chances of a severe shock would be practically eliminated.

The potential gradient in all parts of the ground surrounding the earth connection must also be sufficiently low to ensure that no person or beast walking near the earth connection shall

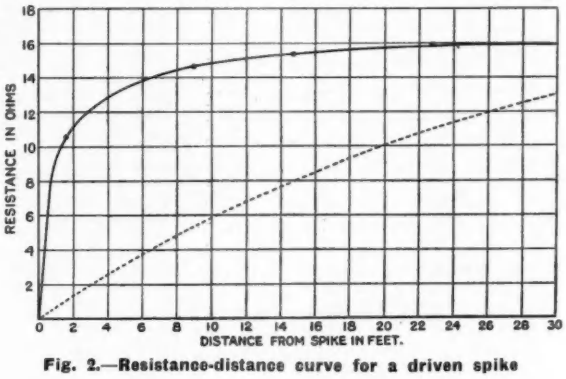


Fig. 2.—Resistance-distance curve for a driven spike

receive a dangerous shock. A single spike or rod will always have a steep resistance curve, and so for safety, quite apart from a consideration of resistance value, it is always best to use some form of distributed earth connection, such as a number of rods or spikes in parallel. Any such distribution which is found necessary to obtain a lower resistance is also of value in reducing the potential gradient.

Electricity in the Tannery (*Concluded from the previous page*)

kid finished warehouse is a roomy department and in addition to exceptionally wide windows and powerful electric lighting, each sorting table is provided with Benjamin shades fitted with daylight glass screens. During the winter months this artificial daylight renders accurate grading of colours possible. The works manager informs me that he finds these shades economical and trustworthy as regards correction of light.

Sheepskin dressing for leather clothing and for fancy leathers is carried out in another section of the plant and all the various manufacturing units are electrically driven. The company has its own private degreasing plant which is served by a 30-h.p., 300-r.p.m. Crompton-Parkinson motor which also supplies power for the sheepskin tan shop. Highly inflammable petroleum is used for extracting the natural grease from sheepskins, and very great care has to be taken during the operation.

In these days of depression it is pleasing to encounter firms which are really busy. This well-known Derby tannery is at present turning out more glacé kid than the plant is theoretically supposed to do, but there has been no trouble and none is anticipated. There is little doubt that electricity has enabled this firm to make genuine economies, and decrease its costs of production.

Electrical Blast Furnace Plant. By C. H. S. Tupholme

ONE of the problems encountered in blast furnace operation relates to the hoisting of the materials (iron ore, coke, and limestone) to the top of the furnace, where they are fed through bells and a hopper. These bells are somewhat in the nature of a hoist, being generally counterbalanced conical containers which are lowered and hoisted to drop the material and then form a seal. The main hoist may be either of the inclined or the vertical type. With the inclined type there is a track arrangement which dumps the car at the top of its travel.

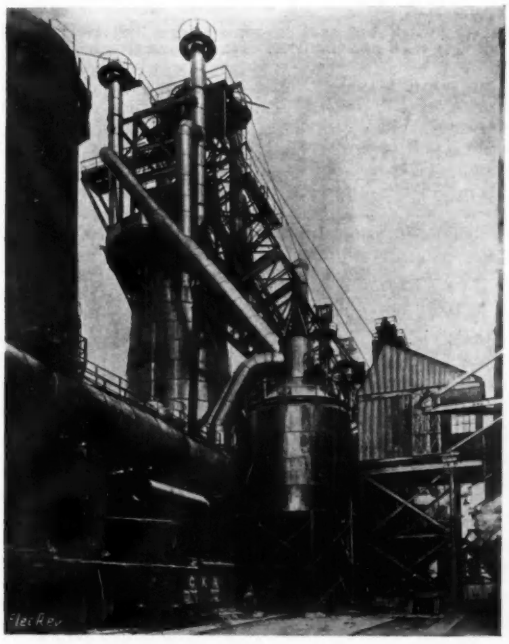
Hoists which lift vertically require two motors, one for lifting and the other for traversing the bucket over the top of the furnace. They present what is practically a lift problem to the electrical engineer. Vertical hoists are similar to cranes, but two-skip hoists have two cars, one going up as the other comes down, while with the single-skip system only one counterweighted car is used.

Accurate Automatic Control

The hoisting motion also dumps the car and, as it is necessary to make the car stop at a certain definite point after it dumps, the chief problem is to get an accurate automatic stop. This must be done when lifting widely varying loads, as a car of ore may weigh five times as much as a car of coke, and, in addition, the dumping arrangement causes a wide variation in load.

In order to carry out these motions successfully it is necessary to ensure an accurate slowdown before stopping, and a compound wound motor has been found suitable. Suitable limit switches are provided in conjunction with automatic control for giving this slowdown and stop. Such limit switches may be either geared to the winding machine or installed along the track. So far as accuracy is concerned, the latter type is usually preferred, as it is independent of cable stretch.

Another application is the bell hoist which operates a counterweighted lever, this in turn opening and closing the bell for feeding the material into the furnace. This is driven by either a crank motion or otherwise by a drum-type winding machine, and automatic control is employed, as this equipment must be operated in a certain definite relationship to the hoist. Compound wound d.c. motors have been frequently used for this type of service, and when an a.c. motor is employed the standard slip-ring type can be used. In the winding machine pattern the stopping is taken care of mechanically, so that the control problem does not arise.



The blast furnace at Cardiff referred to in this article

Some Actual Examples

The B.T.-H. Co. recently received an order for control gear for a d.c. motor to drive a single-skip hoist of the unbalanced type, designed for handling about eighty tons per hour. A motor of 50 h.p. continuous output has been installed, and this is controlled by contactor gear with push-button operation. Automatic current-limit acceleration is employed, also low-speed running by means of diverter connections automatically made at the end of the travel by geared limit switches. In this case track limit switches are used for stopping; and at the end of the hoisting motion the control equipment is arranged to lower the skip automatically after a predetermined time interval for tipping.

Two modern blast furnaces which I have seen in this country employ this form of control. One is at Cardiff and the other at Sheffield. In each case the electrical equipment includes control gear for the furnace skip hoist, the rotating top, and the scale car which feeds the furnace with raw material.

In the case of the Cardiff installation the scale car travels along a track between bunkers containing the ore and coke, and, at a certain point, the car dumps its load into the skip hoist. This car is driven by a 40-h.p. "Witton" motor, collecting its current from two overhead trolley lines. It is controlled by a hand-operated drum type reversing controller with suitably interlocked contactors to ensure that all making and breaking of the circuit does not take place on the drum. Any over-travel of the car is taken care of by tappet switches fixed to the car and operated by track tappets at each end of the track. On the car is also fitted a 5-h.p. shunt-wound motor equipped with an Igranic heavy duty starter. This motor is for driving an air compressor, the compressed air being used to operate the scale car hopper doors for loading the skip. The approximate loaded weight of the scale car is 23 tons, and it travels at about 10 m.p.h. Dynamic braking is provided on the scale car, and in the event of voltage failure a shunt-wound magnetic brake acts on the car axle.

The skip hoist controller is of standard design and is provided with various contactors for controlling the acceleration of the 150-h.p. motor, fitted with a 30-in. shunt-wound brake, which drives the skip hoist. The controller comprises heavy-duty reversing contactors, accelerating contactors under the control of an adjustable timing device, automatic means of giving the required low speeds, and the necessary isolating switches. The skip is first hoisted slowly up to a certain speed by means of a diverter control, and then when the master switch is put over to "full on" the motor runs up to full speed under the control of a timing relay and the various accelerating contactors. When nearing the top of the hoist the motor is slowed down, and on the skip running to the hoist limit switch the motor is finally stopped.

In a similar manner the other skip is hoisted and the first one lowered, a second set of switches in the larger skip hoist limit switch now coming into service again to slow down and stop the motor. There is a five-speed reversing master switch to enable one normal and four low speeds to be obtained in either direction for testing and inspection purposes.

Method of Operation

The two skips run on two tracks at a speed of 300 ft. per minute, and the maximum unbalanced load is 6 tons. The vertical height is 130 ft. and the incline 64 deg. to the horizontal. The time interval between the arrival of the skips at the top is approximately five minutes. In the event of overwinding, protection will be afforded by slack cable switches in addition to that given by the slowdown and stop geared limit switches.

The rotating top is driven by a 10 h.p. series motor, fitted with a 10-in. magnetic brake to ensure quick stopping. The control panel for this top consists of a 480-V automatic starter of the magnetic lock-out type, one ratchet-operated master switch, and one ratchet-operated positioning switch; also a pilot timing switch and a mechanically latched switch which keeps the apparatus in time with the skip and will prevent the equipment getting out of step should the power fail for any reason.

There are two indicating panels fitted with lamps corresponding to the dumping stations, and one lamp to indicate when the hopper is rotating. There is also a hopper limit switch and a bell, and an interlocking solenoid to prevent the valve from being lowered during the period in which the hopper is rotating.

A Progressive Loading System

The normal sequence is a charge of coke alternating with a charge of ore, and the controller is arranged to allow the hopper at the top of the furnace to be loaded from the skip hoist in six journeys. The hopper then moves forward a predetermined distance, and the skip discharges a single load into the hopper, and this is repeated until the hopper has made a complete revolution.

The next step is so arranged that the hopper moves forward twice the first predetermined distance, and at each movement the skip dumps one load. This is again repeated, but the hopper moves forward now four times the first predetermined distance, so that the material is placed in the bell in a spiral formation, which gives the correct distribution of the ingredients. This gear, which is of Igranic design, is all under the control of the master controller on the main platform, and can thus be operated by one man who is stationed on the scale car.

Conductor Temperature Measurement

A means of discovering "hot spots"

THE breakdown strength of an electric cable is largely dependent upon the temperature of the insulation, which is influenced by several factors, such as the temperature of the core, thermal resistivity of the insulating material, temperature of the sheath, thermal resistivity of the surrounding soil, and proximity of neighbouring cables or hot pipes.

Cable breakdowns are most often caused, not by a reasonable average temperature, but by an excessive local temperature rise or "hot spot," which controls the possible loading of the whole cable. The position of a "hot spot" is usually known or can be closely approximated, and if the core temperature is known at that point, the cable can be run right up to the safe temperature at the "hot spot" without risk.

The Elliott cable core temperature-measuring apparatus affords a means of indicating or recording the "hot spot" temperature whereby the apparatus is entirely insulated from the cable core, and can be employed with cables of any voltage. It requires no special pilot wires in the cable, and can be applied to cables already laid.

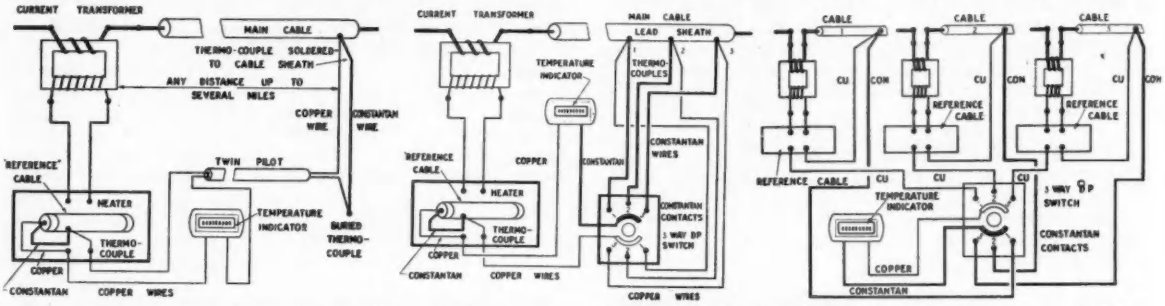


Fig. 1.—Arrangement of connections: (a) when hot spot is remote from indicator; (b) with several hot spots on one cable; (c) with one point on each of several cables

The Theoretical Basis

The method is a rather clever application of the knowledge of the laws governing the flow of heat from the conductor of an electric cable, and is due to Mr. E. Fawssett, chief testing engineer of the North-Eastern Group of Power Companies, who hit on, and protected, the basic idea of splitting the measurement of the conductor temperature into two parts: A, the actual temperature of the sheath, and, added to it, B, the elevation of the conductor temperature over that of the sheath by a method of images, *viz.*, by constructing a model having the same thermal characteristics as the live cable, but fed from a current transformer in that cable's circuit.

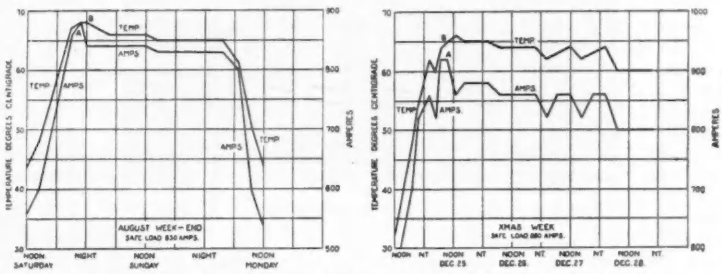


Fig. 2.—Conductor temperatures and current loading. Left: In summer. Right: In winter

The conductor temperature depends on a number of variables, so that the same limiting temperature may be attained under widely varying conditions, *inter alia*, (1) a small load on the cable but great interference with the heat flow, owing to the presence of neighbouring loaded cables or hot-water pipes, so that A will be large and B small; (2) medium load with some interference, as when two cables laid in one trough are carrying current, so that A and B will be more of the same order; (3) very large load combined with very low thermal resistance outside the sheath, as when the cable is laid alone in wet ground, A being then quite small and B more in proportion.

A knowledge of A or B is not of much value by itself, but the sum of the two, which is the actual temperature of the layers of the dielectric next the conductor, is the vital quantity, and is claimed to be accurately given under all conditions by this apparatus.

Conductor Temperature

The elevation of the conductor temperature over that of the sheath depends on the ohmic resistance of the conductor, its temperature coefficient, the current in it, and the thermal resistivity of the dielectric, which may be expressed as the temperature difference in deg. C. between the faces of a centimetre cube to permit the flow of one watt; this usually lies between 500 and 1,000. If a few of the conductor strands be withdrawn from a length of, say, one foot of similar cable to the live cable in use and a few high resistance wires be substituted, so that (when these are fed with a fractional current) the watt loss per foot run is the same as on the live cable carrying the main current, this part of the complete measurement can be simply made by connecting two thermo-junctions in opposition, one being in among the conductor wires and one on the sheath of the dummy.

This measurement is the same for every application of the method, but the arrangement for measuring the sheath temperature depends on the distance from the instrument to the suspected hot spot. When it is so far off that a copper-constantan compensating cable would be too costly or of too high a resistance, a thermocouple is buried deeply enough in the earth, say, 10 ft., to maintain a sufficiently constant temperature throughout the year, as close to the "hot spot" as convenient; this allows all wires to be of copper, except a short length from the cable sheath to the buried reference junction. Pilots are usually available on a cable route, so two cores are picked up for transmission back to the control room where the instrument and model cable are situated, Arrangements of the connections are shown above.

When the "hot spot" is near the control room, as when bunched cables leave a power station in restricted space, compensating cables are employed from each point measured, be it several points on one cable or a point on each of several cables.

Under Working Conditions

Tests made by the North-Eastern Electric Supply Co., Ltd., and also by the makers of the apparatus, Messrs. Elliott Brothers (London), Ltd., showed that the measurement made in this way corresponded closely with the true temperature of the conductor, so the apparatus was installed on a fairly considerable scale using all three methods indicated above. That set out in (a) has been applied to a "hot spot" about two miles from the power station on a most important feeder, the load through which is limited only by the temperature at this point. Here the apparatus has prevented a breakdown, and allowed the maximum safe energy to be transmitted.

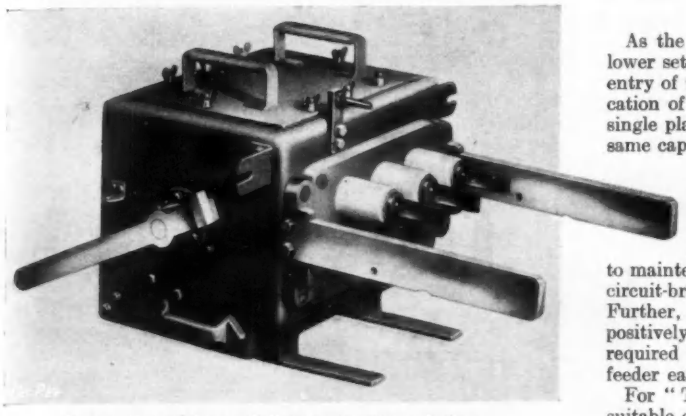
During a week-end in August, when the load increased to 880 A (safe carrying capacity of the cable 830 A), the temperature rose to 68 deg. C. The current was then reduced to 840 A, as shown at A, in the lower figure, and the temperature fell to 66 deg. C., as shown at B.

The graph for a few days in winter (December) shows, by comparison with that for August, that the safe carrying capacity is substantially different in summer and winter so that regulation of the load by temperature indication, rather than amperage, allows full advantage to be taken of this seasonal difference. It will be seen that when the load increased to 920 amperes, the temperature rose to 65 deg. C., as shown at A and B, and continued to rise. The load was then decreased to between 860 and 880 A, thus arresting the temperature rise and maintaining a safe load of 880 A, with the temperature thereafter not exceeding 65 deg. C.

Feeder Earthing Devices

Apparatus developed for mines and other industrial applications

FLAMEPROOF switchgear with self-contained earthing features, and earthing devices for application to existing switchgear, are now being manufactured by the Metropolitan-Vickers Electrical Co., Ltd., primarily to meet the requirements of the mining industry (Rule 131 (g) and Mines Dept. Circular No. 23), but also for other classes of installation.

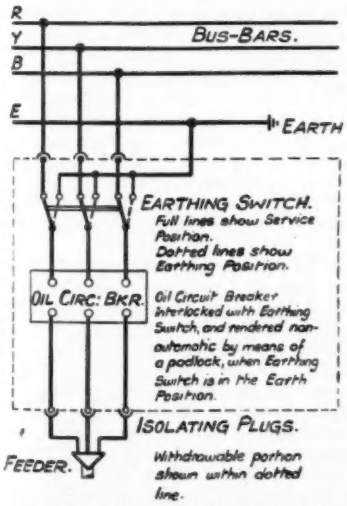


Separate earthing switch for use with existing Type "S" switch pillar

For sub-stations where draw-out truck cubicles are to be installed, the operating handle of a double-throw air-break selector switch on the front of the truck is connected in series with the circuit-breaker. The selector is arranged to connect one side of the circuit-breaker to the bus-bar contacts, or alternatively to earth, so that the feeder can be earthed simultaneously on all phases. A mechanical interlock prevents operation of the selector switch with the circuit-breaker closed. By means of another device the overload trips can be put out of action, so that the breaker will not be tripped if it is closed on a live feeder, or if the feeder is subsequently made alive while earthed.

Method of Earthing

The earthing operation is carried out in a few seconds without withdrawing the truck, and only the correct point in the circuit can be earthed. Where a large number of truck-type cubicles are installed, earthing facilities can be secured inexpensively by having one or more spare trucks fitted with non-automatic oil switches connected on one side direct to earth, thus eliminating the need for the selector switch, and with only one set of three-plug contacts for connecting to the feeder.



Typical diagram of connections for draw-out truck with self-contained earthing switch

Flameproof switchgear for pressures up to 3,300 V, for use either at the surface or underground, can also be supplied with an earthing attachment, which will be fitted to all standard "Type SF" pillars in future without alteration to plugs and sockets.

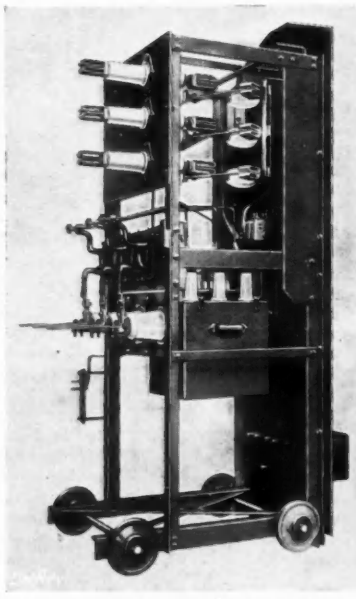
The device consists of a light cast-metal frame slipped over the contact plugs on the draw-out circuit-breaker. When the frame (or earthing plate) is in position and the circuit-breaker is again pushed home, the feeder-contact sockets are connected through insulated auxiliary plugs to one side of the circuit-breaker, the other side of which is plugged into the earthing plate, and the circuit-breaker trips are automatically put out of action. Closing the breaker earths the feeder on all phases.

Protecting the Operator

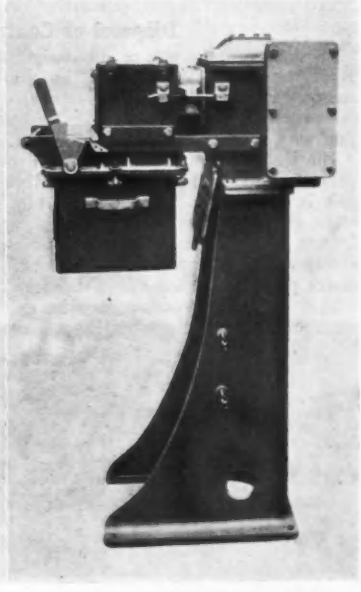
As the feeder may be connected to either the upper or the lower set of sockets on the pillar (according to the direction of entry of the cable), provision is made for preventing the application of the earthing plate to the wrong set of contacts. A single plate can be made to serve any number of pillars of the same capacity.

Making the over-current trip inoperative when using the switch for earthing affords greater safety to the operator if the circuit-breaker has insufficient rupturing capacity to open safely on a short-circuit due to its being too small or to insufficient attention to maintenance, in which case the feeder is disconnected by the circuit-breaker at the remote end, instead of near the operator. Further, when the switch is closed the feeder is, and remains, positively earthed. The protective devices can be modified if required to retain their automatic tripping features until the feeder earthing operation described is successfully completed.

For "Type S" draw-out switch pillars, supplied since 1905, suitable earthing arrangements have been made available. A separate air-break non-automatic earthing switch is provided which must be temporarily substituted for the "Type S" circuit-breaker when earthing is required. The air-break switch can be used with any "Type S" pillar of similar capacity, so that one or two are usually sufficient to meet the needs of a large installation.



Draw-out truck cubicle with selector switch in earthing position



Type "SF" flameproof switch pillar with earthing plate

Provision is made on each earthing switch for reversing the position of the contact plugs to suit either pillars with the feeder sockets at the top or those with the reverse arrangement. The weight of the switch has been kept as low as practicable, and the use of oil has been avoided to facilitate handling. Separate earthing switches of generally similar design can also be supplied for use with "SF" switchgear.

A Welded Transformer Car

A steel car for the transportation of transformers, recently passed its first tests at the Schenectady works of the American General Electric Company. This car, with the exception of the trucks, is of welded construction, and over 5,000 ft. of welding were used. For testing purposes the car was loaded with 141 tons of pig iron, or approximately 11 tons in excess of its designed capacity.

The car is 60 ft. long and 10½ ft. in width. It is provided with two lifts of 2 ft. and 3½ ft. Its height above the rail, without lifts, is 10 ft., and with lifts, 17 ft. The weight of the car alone is 141,000 lb. The tank is constructed of steel, $\frac{3}{8}$ in. thick, welded to stand a pressure of 5 lb. per sq. ft. When the car is put into service, its tank will be filled with gas to prevent the accumulation of moisture.

The Oil-pressure Circuit Breaker

A new Brookhirst-Whitehead development

WHILE a strong believer in the value of oil for arc-quenching in switchgear, Mr. G. E. Whitehead, of Whitehead's Electrical Inventions, Ltd., Cardiff, has been working for some time at the problem from a new standpoint. Instead of endeavouring to meet modern rupturing requirements by strong mechanical construction and the use of an increased length and speed of break, he has relied on a speedy quenching of the arc and the provision of an effective method of preventing its re-striking.

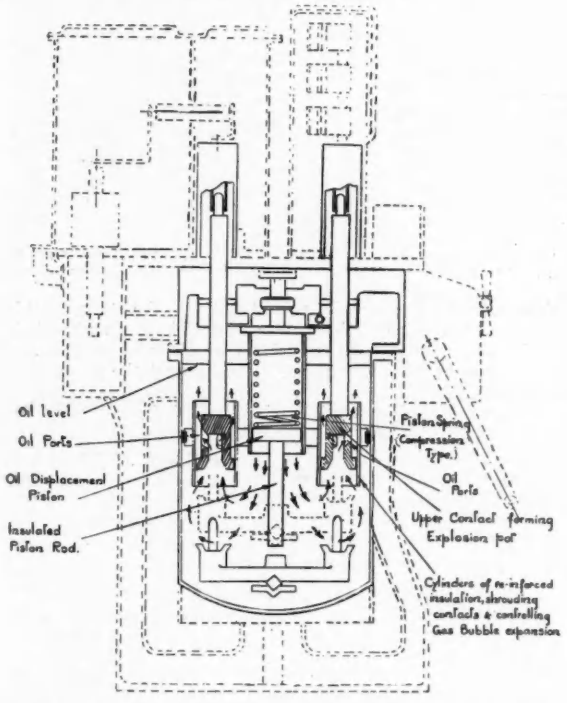
This idea is now embodied in a design that lends itself not only to increased mechanical strength and reduced bulk—both as to floor area and height—but also to maximum accessibility.

A good deal of the development work has been carried out in the factory of Brookhirst Switchgear, Ltd., who are manufacturing high- and low-voltage circuit breakers, which embody the new principle of "oil-pressure rupture" under licence from the Whitehead Co., and on Monday last we had an opportunity of inspecting both types of switch at the Brookhirst works in Chester. The switch contacts, together with a pump, are situated directly in the bath of oil so that the whole body of oil is maintained under a pre-determined pressure. While the circuit is being broken a moving body of oil is forced under high pressure through the contacts and the arcing chambers in such a way as to take immediate control of the arc and gas bubbles which are formed on breaking.

Disposal of Contracts

An important feature of the design, and one which ensures great mechanical strength, is the employment of six-breaker contacts radially disposed about the central pump—the latter comprising a cylinder with a spring-loaded piston—in association with a round top-plate and a cylindrical oil tank.

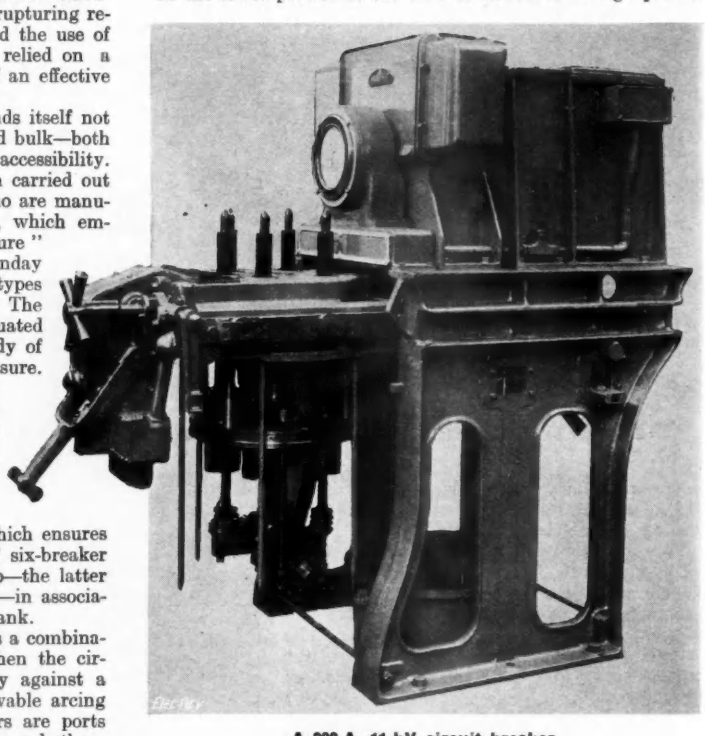
The shape of the fixed upper main contacts gives a combination of contact and explosion pot into which, when the circuit is closed, the lower contact plug fits tightly against a series of three equidistant self-aligning and renewable arcing fingers. In the explosion pot between the fingers are ports allowing free passage to the oil forced upwards through them under pressure. Each upper contact-explosion pot is enclosed within a shrouded arc-quenching cylinder of bakelite with metal reinforcement on its inner surface.


Oil level
Oil Ports
Oil Displacement Piston
Insulated Piston Rod.
Piston Spring (Compression Type.)
Oil Ports
Upper Contact forming Explosion pot
Cylinders of re-inforced insulation, shrouding contacts & controlling Gas Bubble expansion

Breaker "off"; isolator on—showing movement of oil during operation

The lower extremity of the upper contact-pot has a machined surface which makes contact with the moving brushes. The travel of the lower contact plugs, on the upper extremities of which the actual arcing takes place inside the pots, is so timed that the forced flow of oil is established before the plug leaves the upper sparking contacts.

The oil pump is linked up with the breaker mechanism so as to function as part of the normal operation of closing the breaker and thus causes a considerable portion of the cool oil in the lower portion of the tank to be forced at high pressure



A 900-A, 11-kV circuit breaker

through the upper contact-explosion pots and the arc-quenching cylinders. The latter, in conjunction with the movement of oil, restricts and controls the shape and expansion of the gas bubble, and as the contacts part the bubble and arc are attacked by the oil simultaneously and independently, the impetus of the rising oil arresting and quenching any explosive vapours.

At the same time, tests have demonstrated the absence of burning and pitting of the main contact surfaces and that any re-striking of the arc is prevented by the moving column of oil under pressure surrounding a sparking ring through which the lower contacts fall.

The contact bar moves independently of the pump so that after the moving contact has broken circuit the pump still maintains the oil pressure for a period, so giving a further protection against restoration of the arc and at the same time scavenging the explosion pots and arcing chambers.

Opening up the Switch

To isolate and open up the mechanism it is only necessary to move the comparatively light isolator frame within the switch top-plate. Then, by lowering the tank into a recess formed in the ground, and without removing the circuit breaker from its normal position, the contacts and other interior components are rendered visible. Furthermore, for closer inspection or renewal of parts, the breaking contacts can be drawn out in a forward direction by rack and pinion. The oil tank lowering and raising gear is entirely distinct from that used for racking forward the breaker contacts and both operations can be controlled by one man.

When the contacts and oil tank are in their normal working position there are no projecting components at the front except the breaker lever. The capacity of the oil tank is approximately twenty gallons. The cable box, the bus-bar case, and the overload trip-coil current transformer are conveniently mounted on the top of the breaker frame.

Protective interlocks prevent the disturbance or re-establishment of any of the components of the breakers except in a strict sequence that obviates all danger to the operator.

Fifty low-voltage breakers have recently been installed in a large departmental stores in Leeds. These are at present being made for 300 and 900 A at 600 V. The principle is the same as for the high-voltage breaker units, but when inspection is necessary the oil tank is drawn out with the breaker carriage; the contacts are somewhat simpler.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Beauty and Utility

In the correspondence columns of the ELECTRICAL REVIEW one finds reference made to many outstanding matters affecting the electrical industry and its bearing upon public interests. I have not, however, noticed any mention made of a most important matter of public interest, *i.e.*, the utter violation of our old English villages by some electricity supply companies.

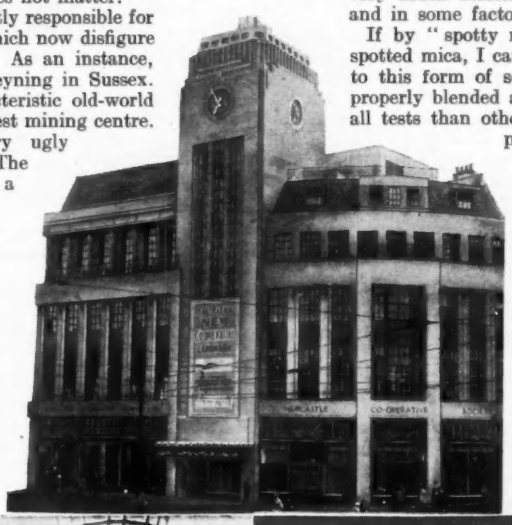
Here in Sussex we have some exceedingly picturesque old-world villages. In the rush and anxiety for consumers and a load some supply companies have shown no regard for any other consideration. Their contemptuous treatment of the sacred beauty of our villages is appalling. A type of engineering mind exists which would only see in a waterfall a possible site for a hydro-electric generating station. The natural beauty of the cascade makes no appeal and if this beauty is destroyed in the building of the station it does not matter.

A similar type of mind is apparently responsible for the ugly poles and sagging wires which now disfigure many of our old English villages. As an instance, come down and have a look at Steyning in Sussex. Once a really beautiful and characteristic old-world village, it now resembles a Wild West mining centre. Straggling overhead lines and very ugly poles all over the place. The result is an abomination; and a disgrace to those responsible.

In your correspondence columns I have read a considerable amount of comment upon "jerry-wiring" by some cheap electrical contractors. Can no one raise a protest in time to save these beautiful villages from the result of "jerry-wiring" by some supply authorities? Has no one anything to say about the cheap and nasty methods sometimes adopted for electricity distribution in our villages? If not, another priceless legacy of the past will be destroyed in the interests of "progress."

JOHN MCCONAGHY.

Crowborough, Sussex,
September 23rd.



The new building of the Newcastle Co-operative Society and examples of the lighting fittings employed (see page 482)

Waste Insulating Materials

My attention has only just been drawn to Mr. Rowell's criticism of my article, which appeared in your issue of September 2nd, owing to my absence from home.

I would say that test room performance is absolutely essential so that no faulty material may go out from the works—this is general workshop practice. I referred to the production of improperly moulded parts as impossible, as the entire moulding cycle is timed perfectly by automatic control. So far as reliability under long service is concerned I can guarantee that properly processed products, made from carefully selected waste insulating material costing 25 per cent. to 30 per cent. less than products made from fresh raw fillers would be better in every way under the same working conditions.

If consumers can get an equally good product that is cheaper they are not going to buy the more expensive product just because the maker uses more expensive raw materials. The day is not far distant when manufacturers of these insulating materials will, in their own interest, have to use their waste material. The time has come to get out of a groove and visualise the possibilities in this direction; *e.g.*, No. 5 mica splittings, costing 1s. 9d. per lb., was believed to be essential for certain work, but it has now been replaced by a waste heap mica dump splitting, costing 4d. per lb., which gives equally good results. Waste micanite (taken off switchgear, windings, &c., where fresh insulation had to be applied, and also accumulated in other ways), can be cleaned of dirt, oil, and resin and reclaimed, the mica splittings being as fresh and pure as those coming from the mines. The cost would be 1d. per lb., or, say, £10 per ton, whereas the cheapest mica splittings, free from dust and chips, are 3½d. per lb., or, say, £32 per ton, and very much inferior. This is done on the Continent and in some factories in the United States.

If by "spotty mica," Mr. Rowell means electrical spotted mica, I cannot see what objection he can have to this form of scrap, as when treated, pulverised, properly blended and bonded, it behaves better under all tests than other fresh raw fillers bonded and employed for the same purpose. The increasing demand for such mica powder is instanced by the increasing import into Great Britain to make up the deficiencies in production. Imports of mica powder were in 1928, 578 long tons; in 1929, 749 tons; and in 1930 (the last year for which figures are available), 963 tons; these figures are taken from Government records. Even though over half the imports were used for other purposes it still gives one food for thought.

Moisture is dried out in conditioning in the usual way, so we can also rule out this objection raised by Mr. Rowell. Very little oil is found mixed with these waste insulating materials if properly stocked, and it can be removed quite easily and cheaply. I made it quite clear in my article that the bond in both cases has to be fresh. My idea was to show in a brief way what was done on the Continent and to make a few suggestions for the guidance of those who had the enterprise to try them out. If Mr. Rowell will mention what he thinks to be other undesirable features I may be able to put him right there, too.

Mr. Rowell appears to have seen some of the inferior Continental products and consequently condemns all products made from waste insulating materials, which is as unreasonable as to condemn all mouldings made here because some poor material is sold by some small British moulders.

The electrical engineer should, in his own interest, send for some of the Continental good material and test it in every way and then compare prices for himself.

London, S.W.2, ARCHIBALD A. C. DICKSON.
September 23rd.

Electric Motors for the Farm

The motors offered by our manufacturers for farm use are, we read from available literature, specially designed for the purpose. As an electrical engineer, interested in electro-farming, I would ask in what respect? Leaving aside for the moment the well-known "Drumotor," it is difficult to note any feature that distinguishes the agricultural motor from the ordinary industrial machine.

In industrial applications the electric drive owes its success to its ability to fulfil requirements at low cost; hence the special designs, types and ratings offered. While it would not be practicable to design electric farm machines on similar bases to the industrial types, having in mind the respective states of development, there arises the question as to whether the ratings should be continuous or intermittent.

One-hour rating may reduce costs by only ten per cent., but the saving in cost would enable electrical engineers to offer an undeniably better proposition in the form of the totally enclosed motor at the same prices. The intermittent rating would be justified by the amount of food that can be prepared in an hour, the undesirability of having too much prepared food lying about the barns on the average farm, the quantity of stock to be fed and the sandwiching of "odd jobs" employing the electric drive.

Portable farm motors, excluding the "Drumotor," are not altogether suitable for both indoor and outdoor use and, including the "Drumotor," are more costly than the simple indoor drive demands, but above all they have no other uses than to drive that which the farmers already possess, and do not allow for the possibility of further development or additional uses.

The totally enclosed motor requires no development in design—there is a wide selection of designs in the industrial and mining sections of electrical manufacture—and it offers the greatest advantages, both indoors and out. Shaft extensions with sunk keys and rose plates held by tap bolts permit of easy fitting, and greatly facilitate the changing of pulleys or drive ratios, whatever the drive may be. One-hour rating instead of continuous rating would counterbalance the cost of these refinements and would be adequate, bearing in mind the fact that threshing, and pumping in certain cases, are the only prolonged duties where the motor output calls for serious consideration, and that barn machines have a capacity beyond the needs of most farms.

But it will always be necessary for manufacturers to take the initiative in producing machines that will not only drive existing plant, but which will lead to a greater use of power.

Newcastle-on-Tyne, *August 29th.* R. H. STOREB.

A Correction

In your issue of September 16th you give a description of the new Gaumont Palace at Wolverhampton, and you state therein that "Electricity supplied by the Wolverhampton Corporation is taken into high-voltage transformers and stepped down by Hackbridge transformers to 400/230 volts."

We would draw your attention to the fact that the transformer which is used in this building for transforming from 6,000 to 400 volts, is of our manufacture, and we should be glad if you could correct the statement published.

ELECTRIC CONSTRUCTION CO., LTD.,
Wolverhampton, W. M. Furniss,
Sept. 21st. *Director and Manager.*

The Overhead Lines Association

THE first meeting of the 1932-33 session of the Overhead Lines Association was held on September 21st at the Institution of Electrical Engineers. The retiring president, Mr. R. J. Jocelyn Swan, was in the chair. The following officers were appointed: President, Mr. A. Lennox Stanton; Vice-Presidents, Mr. F. Christy, Major Theodore Rich, and Mr. R. Borlase Matthews; Hon. Treasurer, Mr. W. Fennell; Hon. Secretary, Mr. G. W. Molle, 32, Shaftesbury Avenue, Piccadilly Circus, W.1. The following were elected to fill vacancies on the Council: Messrs. J. H. C. Brooking, W. C. Bexon, P. E. Rycroft, S. N. Wilson, and W. E. Brandreth.

The report of the hon. secretary for the year ended September 30th showed that the total membership of all classes is now 233, a slight increase on the previous year. There are eight Government Departments and public boards, 180 electricity supply undertakings, and 68 contracting and manufacturing firms represented in the membership. On behalf of the Association Mr. R. Borlase Matthews has undertaken to compile a data book giving the most up-to-date information on overhead lines in Great Britain; all engineers interested, whether members or not, are asked to assist by sending data to the hon. secretary.

The Association's specification for rural transformers is now available at a small charge. The Council has under consideration a proposal for the formation of branch centres throughout the country. The report also mentions that in January, 1932, the president and hon. secretary discussed with members of the Forestry Commission the possibility of utilising home timbers for overhead line supports. It is hoped that the O.L.A. standard wayleaves form will shortly be available at a small charge.

Discussion on Wayleaves

The question was raised as to whether wayleaves were payable for (a) a pole adjacent to the road side of the hedge, but between the hedge and the ditch running along the verge beside the roadway; (b) a pole adjacent to the hedge, but on the field side; and (c) a pole in the field beyond a ditch.

The hon. secretary said he had been advised that the pole referred to under (a) would be on the property of the landowner because, normally, the edge of the ditch remote from the grower was the boundary.

Mr. A. Lennox Stanton held that under case (a) the verge was public property. The Post Office placed poles right in the hedges. Rentals would be payable only for poles situated as in (b) and (c).

Mr. W. Fennell pointed out that, whereas a ditch was the boundary between adjacent lands, that rule did not apply where land adjoined a highway; a ditch alongside a roadway was probably made by the road authority to drain the road, according to a publication by the Land Agents' Society, which showed that the ownership of a highway surface extended from hedge to hedge. On a public highway, poles could be erected without payment. The rule that a landowner could claim 3 ft. from the centre of a hedge as his property, did not apply to a highway.

The president said he had had to pay for poles situated as in (a), where owners could show ownership of the hedge. The Bucks County Council claimed ownership of a highway only from edge to edge of the metalled road.

Lightning Arresters for L.P. Lines

Another query related to a reliable and efficient lightning conductor for low-voltage services. Mr. F. Christy said that where a choke coil of about six turns had been installed between the insulator and the leading-in wire, no harm had been done to the service apparatus or installation, although the lines had been struck. In some districts spark-gap insulators were placed at intervals of half a mile.

The president referred to a case in which choke coils were fitted in both the live and neutral wires of overhead services teed off underground cable. During a storm the overhead line was struck, but the choke coils had apparently prevented damage in the houses supplied from the overhead lines, and the lightning found the easiest path through the meter of the house (nearly 300 yards away) supplied by the underground service. In another case, although choke coils and arresters were fitted on a low-voltage line, lightning had blown the oil-immersed fuses in the current supplying the transformer.

Mr. W. Fennell mentioned that a chapel, served by an underground system, had been struck and the lightning had travelled 150 yards along the cable to another chapel, where it had passed through the wires, guttering, etc., causing considerable damage.

Raising Water in India

THERE is often water scarcity in Bikaner, Northern India. The depth of the village wells ranges from 100 ft. to 400 ft., and camels or bullocks are used to draw water by means of a leather or canvas bucket on the end of a rope—a slow and costly process. Mr. S. C. Cook, the State Engineer, conceived the idea of an electrically driven friction winch with a gantry over the well to carry a pulley over which the rope works.

The winch, manufactured by Witton Kramer, Ltd., consists of a strong channel-iron frame work on which everything is mounted as a compact and combined unit. The G.E.C. "Witton" electric motor drives through a reduction gear the shaft which carries the friction wheel, ahead of this shaft is mounted the cable drum, on one end of which is a cast-iron wheel which engages with the friction wheel.

The cable drum revolves on a stationary shaft, with eccentric ends which can be moved by a hand lever through a few degrees. Moving it backwards brings the cable drum into contact with the friction wheel, causing the latter to revolve; when pulled forward the cast-iron wheel falls on to a fixed brake block, thus holding the load in any desired position. Midway between the two positions the drums are free to revolve by the weight of the bucket on the rope.

The winch is capable of raising 5 cwt. at a speed of 300 ft. per min. The galvanised-iron buckets hold 50 gals. of water. These buckets have brass flap valves in the bottom so that they fill rapidly.

Many similar winches have been made, and they are now working very satisfactorily in different parts of this progressive State.

New Apparatus and Devices

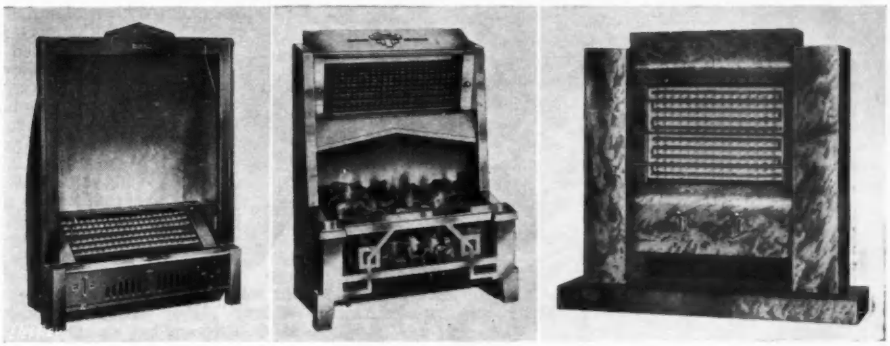
for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

New "Belling" Fires

MESSRS. BELLING & Co., Bridge Works, Southbury Road, Enfield, Middlesex, have recently extended their range of fires by five new models. The "Radiant" is a reflector fire, the reflector being illuminated by a concealed lamp, while a bright glow is also cast upon the hearth just in front of and underneath the fire. The "lighting" is controlled quite independently of the two firebars. A kettle can be heated upon a hinged guard above the bars. The cast-iron frame is attractively finished in electro-plated bronze. With two-heat control the maximum loading is 2 kW, and the price is £2 18s.

The "Studio" (2-heat control, 2 kW, £3 15s.) represents a fire built up of solid marble slabs, the square straight-line effect being very pleasing and suitable for modern decoration schemes. The back is quite flat, so that the fire will stand up close to a wall or tiled fireplace. There are three mottled enamel finishes.

A cheerful and realistic "coal" fire is the "Cheery," in which the imitation fuel is mounted both behind and on top of the bars in front of the fire. Underneath the coal the usual type of fire grate has been cleverly imitated. Lamps which cast a warm glow on to the hearth are concealed by the "fuel."



Three new "Belling" fires: The "Radiant," the "Venetian" and the "Studio"

The imitation feature, including flickering-flame and smoke effects, is controlled independently of the fire bars. These are mounted above the fuel, so as to radiate at a suitable height from the floor. The fire is finished in antique brass, copper or silver, and is loaded at 2 kW; the price is £3 5s.

Another imitation-coal fire is the "Venetian," in which the flickering-flame effect is spread over the surface of the coal, while a comfortable glow is cast in front of and below the fire. The fire bars are placed similarly to those of the "Cheery," and similar finishes with the same loading can be obtained. Price £3 10s.

The "Convexo" meets the demand for a fire suitable for fixing on to tiled marble, &c., surrounds. The back is perfectly flat. The fire is made of heavy-gauge sheet brass, and is finished in chromium plating or bronze. It can be built in when the tiles are being fitted. A 2-kW model (bronze £2 16s., chromium £2 2s.) is suitable for surrounds with openings not more than 16 in. wide and 17 in. high, while a 3-kW model (bronze £3 10s., chromium £4) serves for maximum openings of 16 in. wide and 24 high.

A Simple Tumbler Switch

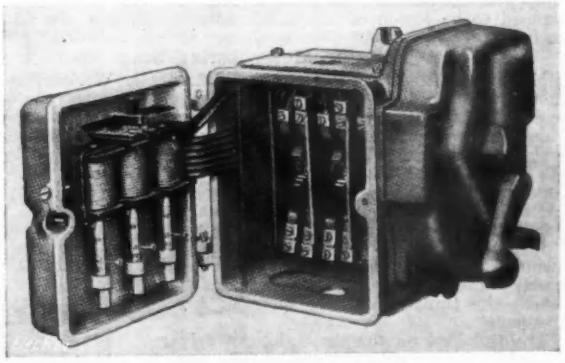
To produce a tumbler switch sufficiently low priced to enable contractors to carry out competitive work and at the same time to use durable material was the object of MESSRS. J. H. TUCKER & Co., LTD., King's Road, Tyseley, Birmingham, in developing the "Spartan" 5-A shockproof switch. This is available in the surface and semi-recessed types. It is distinctive looking and a feature is the absence of exterior ridges. The base is of high-quality English vitreous porcelain, and the cover is made of "Telacite." The cover is attached to the base by interior deep coarse threads at its widest part. Unusually shallow, the switch measures only 1¼ in. overall projection, or less, of course, in the semi-recessed type. In the last-named model the recessed portion is arranged so that blocks designed for miniature switches with 2-in. bases can be used. The operating dolly is a one-piece moulding, forming the dolly, bridge and shield, resulting in greatly increased mechanical strength. The dolly bearings are smooth and highly glazed. Actuated by a heavy compression type of rustproof spring, the contact roller travels along grooves in the china base. Contact clips similar to those in the usual Tucker switches are of phosphor-bronze and shaped to allow them to sit rigidly under the wiring terminal, throwing out an extended blade on either side. Complete contact is obtained by the moving roller forcing its way between these flexible but strong blades. On test 200,000 operations failed to reveal any defect in the switch. A batch of switches was subjected to four times their rated current with satisfactory results. Both the flat and semi-recessed types are available in one-way and two-way models, and in brown, walnut, and white covers with white and brown bases. The list prices are 10s. 4d. per dozen for the one-way flat switch with a brown or walnut cover and a white base, and 23s. per dozen for a two-way all-white semi-recessed switch.

"Spartan" shockproof switch

Air-break Motor Starters

MESSRS. ERSKINE, HEAP & Co., LTD., Lancashire Switchgear Works, Caroline Street, Broughton, Manchester, have marketed a range of air-break starters for three-phase squirrel-cage motors up to 7½ h.p. at 400/600 V, and 5 h.p., 200 V. Conforming with H.O. Regulations, the case and lid are of cast-iron and the starter is arranged for hand operation and has a correct sequence device and a tripping push-button.

It is of the drum pattern, a feature being that by removing two screws the complete drum can be withdrawn. Two, or three overload coils can be fitted, together with the necessary no-volt release. The overload devices have oil dashpot time lags as standard. These are secured in the lid and take the form of relays which break the circuit of the no-volt release coil; they are cut out of circuit in the starting position for both star-delta and direct starting. The insulation is "Bakelite" throughout. A neat circular 2½ in. scale ammeter can be fitted. The price with no-volt release, three overload coils and time lags is £3 10s.



Erskine Heap starter, "open"

A Porcelain Lampholder

The accompanying illustration shows a new porcelain lampholder recently marketed by Messrs. DORMAN & SMITH, LTD., Salford, which is intended for use in places where expenditure on an enclosed fitting is not justified and yet dependable material is essential. New features are the incorporation of terminals of the double-screw type suitable for looping in, and the provision of two knock-outs in the porcelain base for use when surface wiring is employed. As all metal parts are plated and are locked in the pot by the "D. & S." patented method, a long trouble-free life is claimed for this holder.

The "D. & S." porcelain lampholder

A Home Ultra-violet-ray Lamp

The obstacle presented by high cost of apparatus to the use of ultra-violet light in the home is claimed to have been overcome by Mr. A. BRODERSEN, 11, Northampton Square,

Goswell Road, E.C.1, in the "Stella Vita" ultra-violet-ray lamp, complete with an adjustable holder, lead and plug for £4 4s. The apparatus possesses a scientifically constructed glass bulb which is permeable to the therapeutically active

The "Becker" table lamp, bell push and connectors

ultra-violet rays emitted by the tungsten filament. It can be connected to any standard a.c. or d.c. supply, and a 300-W lamp provides adequate ultra-violet radiation. The apparatus is claimed to be fool-proof and safe. Spare bulbs cost 17s. 6d. each.

A Portable Meter-testing Set

MESSRS. CHAMBERLAIN & HOOKHAM, LTD., Solar Works, Birmingham, have developed a portable set for testing polyphase meters on site at any load and likely power factor. It provides in a compact form the means whereby a three-phase load may be applied to a meter connected on the secondary side of current transformers with or without potential transformers. The set consists of a polished teak case, 13¼ in. by 13¼ in. by 8¼ in., weighing 32½ lb. with a strap handle and removable hinged lid. A polished "Bakelite" panel carries the instruments, switches, plugs and sockets, and also the handles of the regulating resistances with which the transformers are mounted behind the panel.

The full load on the three-phase supply required is about 20 VA per phase. The current coils of the meter to be tested are fed from the load transformer, red phase to red sockets and blue phase to blue sockets; the check meter is connected to the corresponding sockets. The current in each phase may be varied independently between full load and one-twentieth load, enabling unbalanced loads to be obtained. Ammeters (reading to 1 A at full scale) in the two current circuits are fed from the secondaries of two small current transformers with tapped primaries giving ratios of one to one and five to one, and controlled by two-way switches, so that the secondaries cannot be open-circuited.

Connection between the meter current circuits and the load transformer is made by plugs inserted into sockets, and a diagram indicates the appropriate sockets for a range of power factors between zero lag and zero lead. The pressure coils of the check meter are connected in parallel with the pressure coils of the meter to be tested. A voltmeter with two plugs and three sockets enables the pressure between any two phases to be checked. A set of leads with sockets and marked terminals provides the connection between the testing set and the check meter and also with the test block on the meter panel.

The testing set enables site tests to be made on kilowatt-hour and reactive meters throughout a sufficient range of power factors to secure calibration at any desired load. The set can also be used in the test room or elsewhere for the check meter against a standard indicating wattmeter, and for checking relays, indicating instruments, &c. Similar sets can be supplied for three-phase four-wire use.

The set has been designed to provide a substitute for the common practice of connecting a check meter in series with the meter to be tested for a period of time, which generally gives only the average errors during the period and not those at specified loads. Its use avoids the need for the alternative method of removing the meter to the test room, in which case the error may be modified as the working conditions in which the meter operates may not be reproduced with exactness in the test room.

New "Becker" Products

The "Beckerlite" lamp, made of "Bakelite" with a marble finish, is one of three new lines that have just been developed by MESSRS. G. BECKER, LTD., Stadium Works, Wembley. It is designed for use as a reading or table lamp and is priced at one guinea. A bell push embodying several interesting features is the second of the new products. The plunger cannot drop out when the cap is unscrewed and contact is made not merely by pressing one contact against another, but by a rubbing contact between a metal bridge at the base of the plunger and two phosphor bronze contacts attached to the terminals. The downward movement of the terminal screws automatically forces the leads into recessed slots on the terminals. The price is 10s. 6d. a dozen.

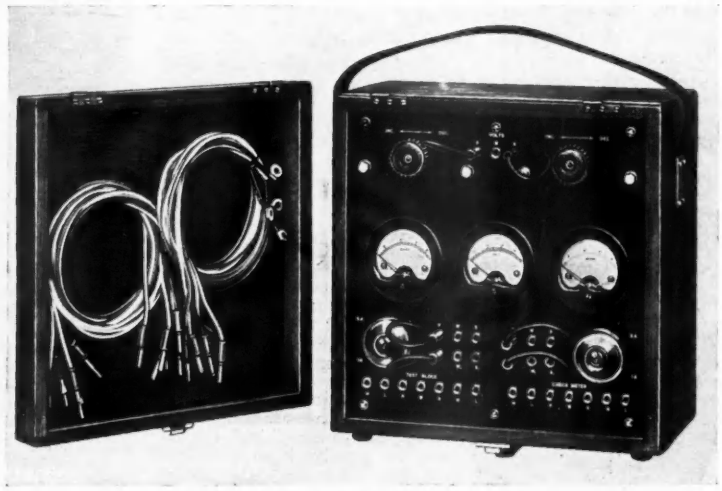
The same firm is also bringing out a new connector. It is air-cooled and the moulding is pierced to ensure better cooling. It is fitted with a universal socket and an especially strong spring designed to give a cleaning action as well as a good contact. The leads are locked together by a bridge which prevents the risk of their pulling away from the contacts. The guard-spring is nickel plated and the whole, as type "1005," sells for 8s. a dozen. Type "1005 E," priced at 9s. a dozen, has an earthing terminal and outside earthing contacts complying fully with the I.E.E. Regulations. Both models have a rating of 10 A at 250 V.

Sealed Stationary Cells

A range of Britannia sealed stationary cells recently introduced by BRITANNIA BATTERIES, LTD., Britannia House, 233, Shaftesbury Avenue, W.C.2, are suitable for use in conjunction with small generating equipment and for public buildings, etc.

The positive plates, 12 mm. thick, are of the Planté large surface type cast in one piece by an improved process which largely eliminates buckling. The negative plates are of the box type 8 in. thick. In the larger cells the separators consist of specially treated wood diaphragms supported by imperishable ebonite rods.

The moulded cell boxes are very robust and have glass ribs on the sides to minimise breakage during service. Separate cell insulators are unnecessary as the boxes have moulded glass insulating feet. A lead strip is burnt to the positive pole bridge and is connected to the negative pole of the adjacent cell by an incorrodible nut and bolt. They are supplied in sizes from 10 to 175 Ah. Stands are available for 25, 50 and 100-V batteries in single and double tiers.



The "C. and H." meter-testing set

Ironclad Circuit Breakers

"Wemco" ironclad circuit breakers produced by MESSRS. WALTER'S ELECTRICAL MFG. CO., LTD., 249 and 251, Kensal Road, W.10, are claimed to comply fully with B.S.S. requirements for enclosed circuit breakers. The removal of the cover automatically opens the circuit, and the cover can only be replaced when the circuit is open. The box ends are drilled for conduit to the size specified when ordering, and the all-metal case is finished black, the interior being lined with insulating material. The bottom of the case is arranged with holes, so that

conduit may be fixed with external and internal nuts. The cover is hinged and fastened with two wing nuts, and it may be made to open either up or down.

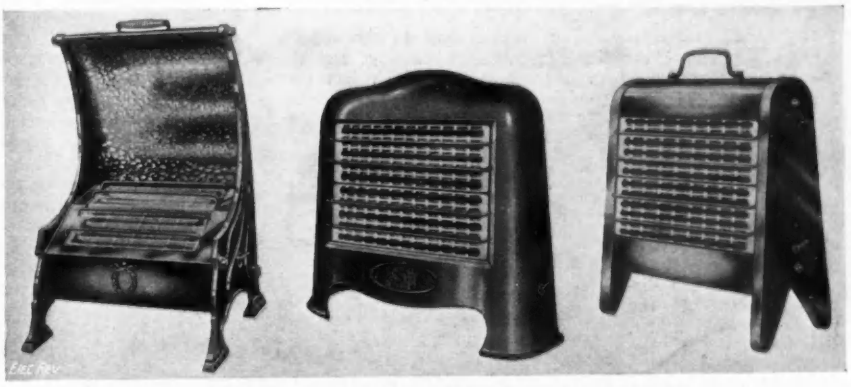
The actuating lever is mounted on the right-hand side of the box, and it is also the manual tripping lever. The cover can be sealed and the breaker arranged so that it can be locked in either the " on " or " off " positions.

The 1932-33 " Revo " Fires

Three new fires have been added this season to the already extensive range manufactured by the REVO ELECTRIC CO., LTD., Britannia Works, Tividale, Tipton, Staffs.

Maximum reflection of heat, together with a very impressive effect, is obtained in the " Sultan," which sells at 14s. 6d. and 21s. for 1- and 2-kW loadings, respectively, and is supplied in sprayed oxidised silver and sprayed bronze.

The " Caliph," also available with both 1- and 2-kW loadings, has a plain cast-iron front of simple lines designed specially for cleanliness. A wide range of self-coloured, non-chipping vitreous enamel finishes is to be obtained, as well as mosaic, mottled, and rainbow combinations. Prices are from 13s. to 29s., according to finish.



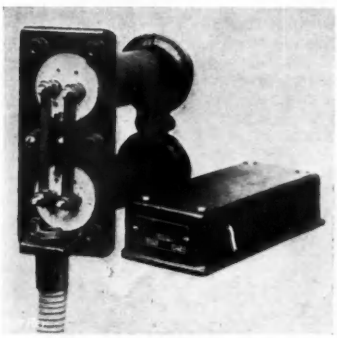
Three new " Revo " fires: The " Sultan," the " Caliph," and the " Selmore "

The third model, the " Selmore," has sheet metal sides and a one-piece front and back, and is made in sprayed oxidised silver and oxidised bronze finishes. It is retailed at 8s. 6d. for the 1-kW and 16s. 6d. for the 2-kW model. Each of these new fires is complete with two yards of flexible cable fitted to a terminal block.

Reductions have been made in the prices of the " New Sunbeam " bowl fires, which are now sold at 10s. 6d., and the " Regent " models (11s. to 32s., according to finish), while the " Challenge " fires are now available in the new mosaic finish at 25s. 6d., 35s., and 58s. for the 1-, 2- and 3-kW models, respectively.

Electric Heaters for Tabloid Machines

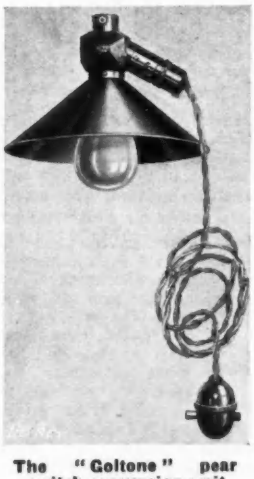
ELECTROWAY HEATERS, LTD., Baxter Gate, Loughborough, have recently supplied and fitted electric heaters to a chemical tabloid - making machine, the substance from which the tablets were made requiring to be kept at a given temperature to prevent solidification. An old jacket was fitted round the hopper containing the powder, and the oil heated by means of a number of 40-W immersion heaters arranged for heat control in four stages. The revolving die plate for forming the tablets was also heated electrically by means of a convection heater to avoid the complication of slip rings and collector gear.



A tabloid machine heater

A Conversion Attachment

" Why hasn't it been done before? " is an oft-repeated question which will again be raised by the announcement of the " Goltone " pear switch conversion attachment by Messrs. WARD & GOLDSTONE, LTD., Frederick Road (Pendleton), Manchester. The main feature is a two-way adaptor with special internal connections for the pear switch. An outfit, including this adaptor (2s. 6d.), six feet of twin art silk flexible cord, and a pear switch, is available for 5s.



The " Goltone " pear switch conversion unit

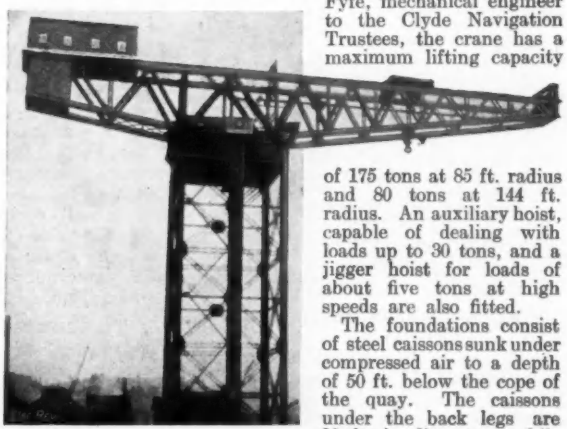
An Improved " Eclipse " Tool

In our issue of January 1st, 1932, we described a novel and handy outfit (the " Eclipse 48 ") produced by MESSRS. JAMES NEILL & CO. (SHEFFIELD), LTD. The manufacturers have now made several alterations which will still further improve the outfit. The price of the set, however, remains at 5s. The set now comprises a plated holder and set-screw and the following tools: Six sawing blades, six slotting blades of various types, with one blade specially ground on both edges for mica cutting, two engineer's scrapers (flat and half round), a belting and lead slitting knife, and a second cut flat file with one safe edge. The set is packed in a neat metal container, measuring 5¾ in. by 1¾ in. by 1 in., which makes it very convenient. When used for sawing or scraping the nickel-plated holder is in line with the tool and at an angle when slotting or slitting to permit of clearance for the operator's fingers. A second-cut general purpose file with one safe edge is now included in the outfit.

One of the many uses for the tool is the undercutting of commutator mica, but up to the present difficulty has been experienced owing to the fact that the width of the mica is often less than 23 gauge, the thickness of the lightest slotting blade included in the outfit. Thinner blades would be too brittle and whippy to be of real service, but to meet the demand for a blade that may be used for undercutting the mica of the smallest commutators, a special 18 gauge blade is now included ground at the edges to a sharp " V." The shape of the holder has been still further improved by rounding off the corners. Finally, a number of 32 teeth sawing and slotting blades are now included with the set to meet the wishes of many users for a finer pitch of tooth than 22.

A Large Electric Cantilever Crane

THE new electric cantilever crane at Stobcross Quay has been specially designed to facilitate the fitting-out of vessels. Constructed by Messrs. Cowans, Sheldon & Co., Ltd., to the specification and under the supervision of Mr. Daniel Fyfe, mechanical engineer to the Clyde Navigation Trustees, the crane has a maximum lifting capacity of 175 tons at 85 ft. radius and 80 tons at 144 ft. radius. An auxiliary hoist, capable of dealing with loads up to 30 tons, and a jigger hoist for loads of about five tons at high speeds are also fitted.



The large new Cowans, Sheldon crane installed on Clydeside

The foundations consist of steel caissons sunk under compressed air to a depth of 50 ft. below the cope of the quay. The caissons under the back legs are 20 ft. in diameter, while those at the front are 30 ft. by 10 ft. The legs of the main tower are 45 ft. apart and are of the double " L " section to permit of efficient connections for the bracing and the beams at the top, which carry the roller path and centre girders. The slewing of the main cantilever is operated by a series-wound motor of 50 b.h.p. at 400 r.p.m. through worm and spur gearing. The main rack is 48 ft. 4 in. pitch diameter and the teeth are 5¾ in. pitch by 10 in. deep. The main lift is operated by a 165-b.h.p. series-wound motor.

The electrical energy for operating the crane is obtained from Glasgow Corporation at 6,500 V. Either d.c. or a.c. can be provided to ships when being fitted out, and for lighting the decks.

The main cantilever has a maximum length of 253½ by 30 ft. deep at centre. The lower roller path has a mean diameter of 45 ft. and consists of cast-steel plates 4 in. thick. There are eighty rollers, made of specially hard cast steel, each being about 13½ in. dia. by 14 in. long. The top roller pathway is similar in construction to the bottom pathway. A passenger hoist, capable of handling loads up to 10 cwt., is provided on the tower. The hoist has a clear lift of about 117 ft.

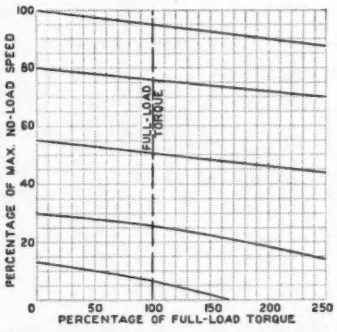
A.C. Commutator Motors

Some applications of the variable-speed (shunt-characteristic) type

THE B.T.-H. variable-speed a.c. commutator motor with shunt characteristic is essentially a slip-ring induction motor with the position of the primary and secondary windings reversed and with the addition of a third winding and commutator.

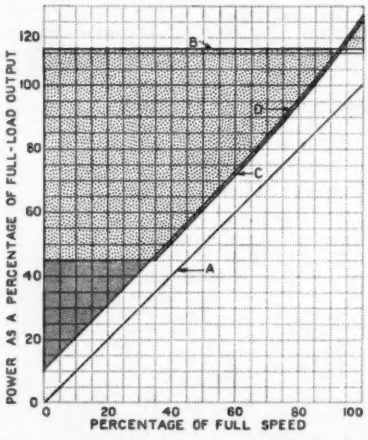
The rotor (primary) winding is connected to the supply through slip rings; the third (regulating) winding, also on the rotor, is connected to a commutator, which has two brushes capable of relative rotation. One end of the stator (secondary) phase windings is connected to a brush stud, and the other to the corresponding stud on the brush rocker.

The greater the distance apart of the brushes, within limits, the greater is the amount of regulating winding in series with the stator.



Torque-speed curves of the B.T.-H. variable speed commutator motor (shunt characteristic)

The voltage induced by the primary in the secondary of an induction motor is a function of the speed of the machine, the induced voltage is at a maximum at standstill, and zero at synchronous speed. If the rotor were revolved, by external means, at twice synchronous speed, the induced voltage would be equal to the standstill voltage, but opposite in sense.



Curves showing economy gained by using B.T.-H. commutator motors as compared with ordinary induction motor and rotor resistance

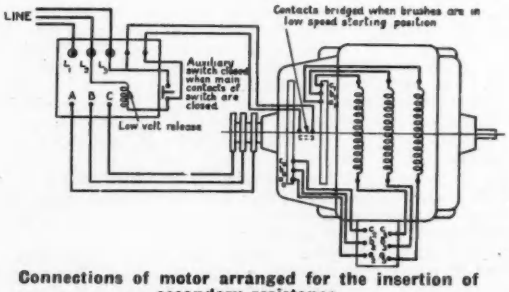
Curve A=Output; Curve B=Input to induction motor, with rotor resistance control; Curve C=Input to commutator motor, with 3 : 1 speed range and resistance for creeping; Curve D=Input to commutator motor, with long speed range. The shaded areas indicate the saving in power.

The stator winding of the variable-speed motor is shorted through the commutator segments causing the motor to run as an induction machine at slightly less than synchronous speed. Relative rotation of the brush rings produces a voltage between the brushes of each phase, the value of which depends upon the distance between them, *i.e.*, on the amount of regulating winding in circuit with the stator.

Means of Control

The injection of this voltage into the stator winding causes the motor to change from synchronous speed to the speed at which the induced voltage is sufficiently increased to restore the balance. Any speed, above or below synchronous, within the range can be obtained by rotating the brushgear.

Speed variation between no load and full load is from 2.5 to 10 per cent. of the maximum, depending upon the size of motor and speed range. The windings can be designed to obtain creeping speeds of one-fifteenth of the maximum by moving the brushgear. For inching the motor should have a smaller speed range with a resistance in each phase of the secondary winding.


LINE
Contacts bridged when brushes are in low speed starting position
Auxiliary switch closed when main contacts of switch are closed
A B C
Low volt release

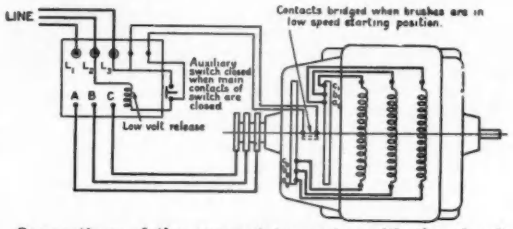
Connections of motor arranged for the insertion of secondary resistance

With constant secondary current the torque is constant throughout the speed range, *i.e.*, the output is proportional to the speed. The motors can be designed to suit drives with other torque-speed characteristics, *e.g.*, for fans and pumps, where the torque is proportional to the square of the speed. A higher efficiency is claimed than with the slip-ring motor, since there are no losses in rotor resistances, or with a Ward-Leonard set of three machines, and for a great part of the speed range a higher power factor than the former. The current commutated is only a fraction of the total, and sparking is negligible.

Applications

The a.c. commutator motor is particularly suitable for the following drives, among others :—

(1) The alternators of a frequency changer in an artificial silk mill; the speed of the small a.c. motors driving the spinning spindles can be controlled by varying the frequency.


LINE
Contacts bridged when brushes are in low speed starting position.
Auxiliary switch closed when main contacts of switch are closed
A B C
Low volt release

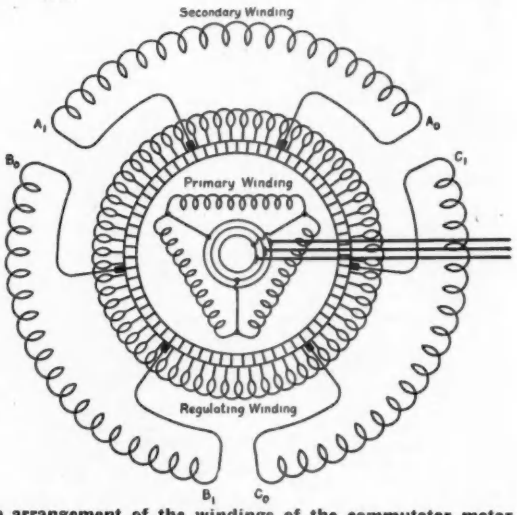
Connections of the commutator motor with the circuit breaker

(2) High-speed lifts of over 200 ft. per min.; the motor must exert a high starting torque, and accelerate and decelerate (the latter by regenerative braking) in a few seconds only.

(3) Large wheel lathes for which the motor has a constant h.p. over part of the range and a constant torque over the remainder; by adjusting the speed wheels of various sizes can be machined. Push-button control of the brushgear ensures immediate reduction in speed when hard spots are encountered.

(4) Machine-tool drives generally, owing to the very slight increase in speed when the cutting tool is withdrawn.

(5) Large newsprint machines, instead of Ward-Leonard sets.



The arrangement of the windings of the commutator motor (shunt characteristic)

(6) Pumps for hydraulic lifts or capstans; the rise and fall of the accumulator is made to operate the brushgear through chains.

(7) Printing presses, which require uniform acceleration without snatching. Tests made against a resistance-controlled induction motor showed a saving of 25 per cent. in time and 50 per cent. in running costs.

(8) Rubber calendars; smooth acceleration and accurate speed control facilitate the production of consistent sheeting at any speed between 60 and 20 yd. per min.

The first B.T.-H. variable-speed a.c. commutator motor was installed in 1916, and upwards of 50,000 h.p. is now in operation.

The Copenhagen Exhibition

A comprehensive British display in a friendly market

ON Saturday last H.R.H. the Prince of Wales declared open the British Exhibition which has been organised at Copenhagen under the auspices of the Federation of British Industries and the British Imports Union, with the active support and encouragement of Danish commercial interests.

The show is in the beautiful Tivoli Gardens, a view of which we reproduce, and its success appears to be ensured by the keen interest which the Danish people are displaying. It remains open until October 9th.

The Tivoli Gardens, Copenhagen

At the opening ceremony the Prime Minister of Denmark (M. Stauning) reminded those present that Great Britain had built Denmark's first steamship, had planned most of the Danish railway system, had designed most of the country's gasworks, and Copenhagen had just bought British plant for its latest electricity works.

The 500 exhibitors include a number of leading British electrical manufacturing concerns as well as many whose products are of indirect electrical interest. The following notes indicate the nature of the principal displays in these classes.

The "Goblin Wizard"

Messrs. Babcock & Wilcox, Ltd., have a stand forming a representation of a boiler front on which are shown three models of the company's land and marine boilers; an animated model of a cross-type boiler economiser and air-heater showing the circulation of the gases, &c.; and examples of valves and piping.

The British Vacuum Cleaner & Engineering Co., Ltd., exhibits a number of its machines, including the "Magic Wand"—a lightweight pattern adaptable to many cleaning operations and the "Goblin Wizard," which is illustrated. For heavier work the company puts forward the "Goblin Major" with a 350-W motor. All these machines are supplied with a set of cleaning attachments.

Among the exhibits of the Cambridge Instrument Co., Ltd., is an illuminated moving scale temperature indicator (illustrated). In this a transparent scale is mounted on the moving coil of the galvanometer; a portion of this is optically projected on to a translucent screen having a fixed pointer. By this means a magnification giving a 20-in. scale is obtained in the instrument exhibited; even larger magnification is obtained in other instruments of the range. Other instruments shown include "easy-to-read" dial thermometers, mercury-in-steel indicating and recording thermometers, a combined temperature and humidity recorder, electrical distance thermometers, and radiation and optical pyrometers, as well as boiler house, general engineering and electrical measuring instruments. In the last class is the latest form of the company's "Electro-Cardiograph."

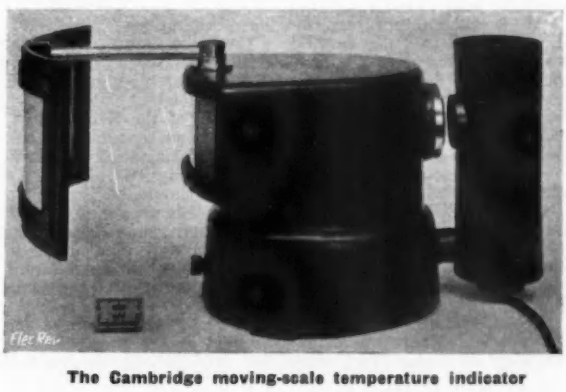
A new single-phase kWh meter (Type H) is the principal feature of Messrs. Chamberlain & Hookham's exhibit. The size and weight of this meter have been kept as low as possible consistent with accurate operation. It is claimed to operate satisfactorily over a wide range of loads, and the adjustments are fitted with indicators facilitating the setting and recalibration. A prepayment meter adapted to Danish conditions is shown; it takes krone or 10-ore pieces. Other examples of the company's products appear.

Messrs. Ferguson Pailin, Ltd., have a display of metalclad compound and oil-filled switchgear, together with a number of round tank breakers of various capacities. The metal-clad units include a duplicate bus-bar, transfer selection equipment for service up to 33,000 V. This unit incorporates the round-tank-type oil circuit breaker, and the circuit breaker is vertically isolated by means of motor operated raising and lowering screws. With the circuit breaker in the isolated position in this unit, the tank may be removed for inspection of contacts, the breaker remaining in the unit.

A further metal-clad exhibit comprises the recently developed type "VSB5," single bus-bar unit for 11,000-V service. An individual circuit breaker transporting truck is included in each unit, the breaker raising and lowering mechanism being integral with the truck.

A new "C. & H." single-phase kWh meter

Lower capacity substation switchgear exhibited includes two examples of the compact "BV" gear, one unit being an 11,000-V ring main equipment. The several distinctive features of the company's designs are demonstrated in these exhibits, including the principle of vertical isolation. Among the smaller exhibits is an oil immersed plug fuse for 11,000-V rural service. Four demonstration pedestals, which may be operated by the visitor, show the Ferguson, Pailin factory, by means of stereoscopic photographs; a further set of stereoscopic views, illustrating the manufacture of a round tank breaker; the flexibility of the standard f.p. finger contacts, and an example of the company's patented self-aligning plug and socket isolating device, as used on vertically isolated metal-clad gear. A cinematograph film showing typical round tank



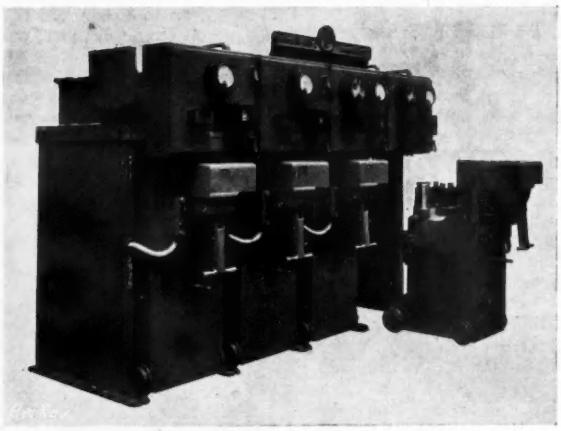
The Cambridge moving-scale temperature indicator

breakers actually undergoing short circuit testing is demonstrated in a small cinema on the stand.

The General Electric Co., Ltd., is showing on the stand of Th. Ammentorp-Schmidt examples of its overseas model cooker (D.C.5735L) and its table cooker (D.C.57221). The former, which no doubt meets Danish requirements better than the usual type of English cooker, is made in two patterns, equipped with two or three boiling plates. The oven is equipped with top and bottom heating and a drop-down door.

The " Magnet " overseas cooker

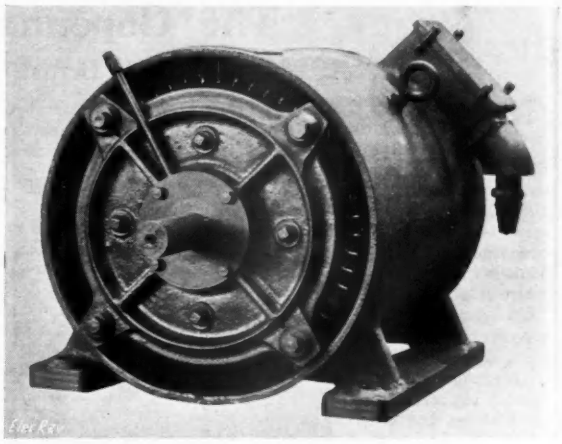
A new G.E.C. appliance shown is a portable reflector for providing intense light for indoor photography. It is of aluminium, having a highly diffusing sand-blasted surface inside and finished in crystalline black enamel outside. The reflector is mounted on a short pillar enclosed by a heat insulating wooden handle, a circular base being screwed to the lower end of the pillar. Tilting at any angle is effected by means of a knuckle joint and wing nut, and a simple focusing device is fitted. The lamp used is a high-efficiency " Osram " 500-watt photographic type with internally frosted bulb.



A four-panel F.P. " VSB5 " unit (11,000 V)

Examples of their machine tools adapted to electric drive appear on the stand of Messrs. Alfred Herbert & Co., Ltd.

Messrs. George Kent, Ltd., display typical examples of their meters for water, air, steam, gas, oil, &c., including a number of power-station instruments. Among them are a Venturi meter suitable for feed-water or condensate measurement; a shunt steam meter specially applicable to small mains (about 2 in. in diameter) giving a direct reading in pounds and kilogrammes; and a series of meters arranged for flush panel mounting, including the combustion efficiency meter illustrated.



The " Emcol " totally enclosed motor

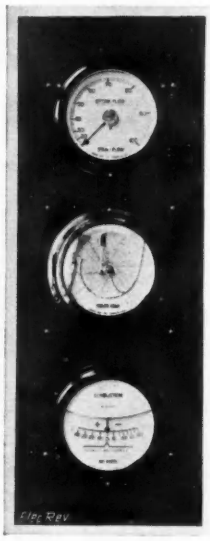
Motors form the exhibit of Messrs. Laurence, Scott & Electromotors, Ltd., upon the stand of the Scandinavian Steel & Shipping Agency. There are three sizes of the " Emcol " patent totally enclosed squirrel cage machines—7, 17 and 25 h.p., respectively. The " Emcol " has its two ends connected by a series of sealed tubes through which an internal fan circulates air. The tubes are surrounded by a casing through which air is driven in an opposite direction by an external fan. By this means it is claimed that most of the equivalent output of an open-type machine can be obtained.

A 20-h.p. patent " Steel Frame " three-phase ventilated drip-proof motor is another exhibit. This is of the squirred cage pattern running at 1,500 r.p.m. The frame is of welded steel, and ball or roller bearings are fitted.

The batteries exhibited by Messrs. Oldham & Son, Ltd., comprise automobile starter batteries in ebonite cases suitable for all models of cars used in Scandinavia, omnibus batteries, radio accumulators, and stationary batteries for small power stations, farms, emergency lighting in cinemas, &c.

Messrs. Reavell & Co., Ltd., show a number of their compressors.

Smith's English Clocks, Ltd., are exhibiting a range of their synchronous electric timekeepers, and what is claimed to be the first all-British alarm clock.



Kent boiler-house instruments

Electrical and Magnetic Units

THE present position with regard to electrical and magnetic units was discussed in a short paper presented by Sir Richard Glazebrook, F.R.S., and Dr. Ezer Griffiths, F.R.S., before Section A (Mathematical and Physical Sciences) of the British Association at the Association's one hundred and first meeting held recently at York.

At a general meeting of the International Union for Physics held in Paris in 1931, a Commission was appointed to deal with symbols, units and nomenclature. This Commission had decided to deal with electrical magnitudes, and in co-operation with the International Electrotechnical Commission and the committee of Section G of the British Association, it proposed to issue to its national committees and other parties interested a questionnaire relating to (1) the basis on which a connected account of electromagnetic phenomena should rest (whether the starting point should be Coulomb's Law), and (2) μ, permeability (whether this should be treated as a quantity having dimensions in length, mass, and time, or as a pure number, *i.e.*, are H, the strength of a magnetic field, and B, magnetic induction, quantities having different dimensions or can they be regarded as quantities of the same kind?)

A conference between the British National Committee for Physics and others interested was held at the Royal Society on May 19th this year, when the principles of the British reply to the questionnaire were agreed to with three dissentients. The conference accepted Coulomb's Law as a starting point, and was in favour of treating μ as a quantity having dimensions. A schedule of magnetic measurements was drawn up as the result of the conference for presentation to the main body.

During the Electrical Congress held in Paris in July last (ELECTRICAL REVIEW, July 8th, p. 42), at an informal conference of the countries represented, it was unanimously agreed that (1) any system of units recommended must retain the eight internationally recognised practical units, joule, watt, coulomb, ampère, ohm, volt, farad, and henry; (2) the C.G.S. system of units was suitable for the physicist; (3) a system of practical units, including the eight units, could be derived from these by multiplying the C.G.S. units by appropriate powers of 10.

The authors referred those who objected to Coulomb's Law to Appendix C of the Second Report (Newcastle, 1863) of the Electrical Standard Committee, by Clerk Maxwell and Fleeming Jenkin, dealing with the elementary relations between electrical measurements. Until something equally satisfactory was provided on which to base electromagnetic theories, the authors stated that they preferred to employ the historic method of Maxwell and the founders of the C.G.S. system.

Overhead-line Terminal Boxes

TIER-type terminal boxes have been introduced by W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1, with a view to simplifying the connection of low-voltage overhead conductors in vertical formation to underground cable. The overhead conductors loop direct from the insulators to the base fittings and cannot foul each other on the pole. The lead sheathing of the cable may be mechanically bonded or wiped to a special gland. Neither insulators nor fitting have to be removed during erection.

The body of the box is made of heavy-gauge sheet steel. The insulators and conductor fittings are secured to the front, and only the back of the box and the gland end need be removed while making connections. As the fixing brackets are reversible, the box can be fitted to either side of a pole; chain straps can be supplied for either wood or steel poles, but coach screws run through holes in the fixing brackets may be used for wood poles.

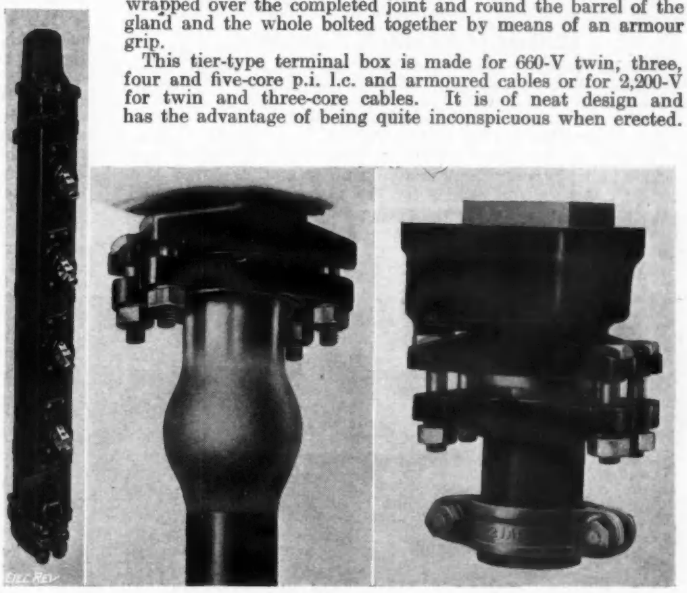
The sheet-steel box is made rust proof by "Parkerising," which converts the surfaces into phosphates that are insoluble in water. The crystalline surface so formed provides a good base for the two coats of bitumastic paint afterwards applied.

The mechanical bonding is performed by a lead-cone gland cast in one piece; a transverse split, extending nearly the whole length of the cone, leaves a narrow bridge at the larger diameter, which collapses when pressure is applied to the tapered clamping ring, thus pressing the two halves of the cone together round the lead sheath and preventing leakage of compound. The top fixing of the cone (which is in contact with the c.i. gland end) is provided with rings which give several self-adjusting contacts

When the lead-cone gland is used with armoured cable, the armouring is wrapped round and gripped to the lower end of a steel barrel which is fitted between the tapered clamping ring and the cone.

The alternative method of wiping the lead sheaths is provided by a tinned-brass gland, the claws of which are bent down on to the sheath; the plumbing metal passes between the claws, giving an efficient bond and also rigid support for the cable. When the cables are armoured, the armouring is wrapped over the completed joint and round the barrel of the gland and the whole bolted together by means of an armour grip.

This tier-type terminal box is made for 660-V twin, three, four and five-core p.i. l.c. and armoured cables or for 2,200-V for twin and three-core cables. It is of neat design and has the advantage of being quite inconspicuous when erected.



Left: The tier type box assembled; centre: tinned brass wiping gland; right: armour grips

Two Radio Shows

TWO radio exhibitions are at present being held in the North, one at Manchester and the other in Glasgow.

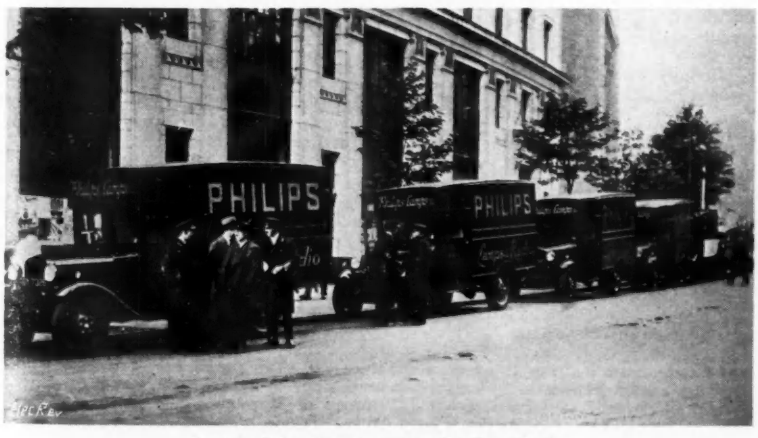
The Northern National Radio Exhibition, which was opened at the City Hall, Manchester, on Wednesday last and remains open until October 8th, is one of the most representative displays of the radio trade which has ever been held in the provinces, and over 100 manufacturers of radio apparatus and components are exhibiting.

These include the British Thomson-Houston Co., Ltd., whose stand is devoted entirely to the company's wide range of gramophone motors, including the "Truspeed," "Universal," "Golden Disc," and "Synchro-Blue" models. The Edison Swan Electric Co., Ltd., is showing the whole range of its h.t. batteries and l.t. accumulators, radio sets, and B.T.-H. pick-ups and tone arms. The display of the Westinghouse Brake & Saxby Signal Co., Ltd., includes new radio type rectifiers, h.t. and l.t., a new copper-oxide photo-electric cell, four new "correct rate" multi-circuit charging sets and other types of multi- and single-circuit chargers.

The exhibit of the Fuller Accumulator Co. (1926), Ltd., is similar to that staged at the recent Olympia Exhibition, and includes h.t. and grid bias dry batteries, and h.t. and l.t. accumulators. Radio Instruments, Ltd., are showing for the first time a further model of the "Antinodal" short-wave convertor which has been designed for use in conjunction with any a.c. mains-operated set.

Among the other well-known companies who are exhibiting are:—Pelling & Lee, Ltd.; Britannia Batteries, Ltd.; Brown Bros., Ltd.; Brownie Wireless Co. (G.B.), Ltd.; Celestion, Ltd.; Chloride Electrical Storage Co., Ltd.; E. K. Cole, Ltd.; A. C. Cossor, Ltd.; Dubilier Condenser Co. (1925), Ltd.; Ever Ready Co. (G.B.), Ltd.; Ferranti Ltd.; General Electric Co., Ltd.; Igranic Electric Co., Ltd.; Kolster-Brandes, Ltd.; Marconiphone Co., Ltd.; Philips Lamps, Ltd.; Siemens Electric Lamps & Supplies, Ltd.; Telsen Electric Co., Ltd.; Mullard Radio Valve Co., Ltd.; British General Manufacturing Co., Ltd.; Electro-Dynamic Construction Co., Ltd.; L. McMichael, Ltd.; Varley and Partridge, Wilson & Co.

A new departure in radio propaganda was organised in connection with this exhibition by the Radio Manufacturers' Association and the *Wireless & Gramophone Trader*, in which nearly forty manufacturers took part. This took the form of a convoy of seventy decorated vehicles which left London on Monday last, and after stopping at a number of the more important towns *en route* arrived in Manchester on Tuesday evening. Mr. H. A. Read (Philips Lamps) acted as honorary chief marshal.



A part of the R.M.A. convoy for Manchester

At Glasgow

The Glasgow exhibition, which was organised by the *Glasgow Weekly Herald*, was also opened on Wednesday in the St. Andrew's Hall by General Sir Ian Hamilton. The chair was occupied by Lieut.-Colonel F. N. Westbury, O.B.E., of the G.P.O., and among others who spoke were Mr. David Cleghorn Thomson, Scottish Regional Director (B.B.C.) and Mr. Alex. Steuart (president, Scottish Radio Retailers). The opening ceremony was broadcast to Scotland by the B.B.C. The exhibition will remain open until October 8th.

There are sixty-eight stands, featuring the latest receivers, components, and other products of the wireless industry. The G.P.O. is co-operating with the organisers of the exhibition, and the exhibit and lectures dealing with the interference problems are proving a highly popular feature. The object is to demonstrate that interference can be generally eliminated by the use of simple filter arrangements at its source. The B.B.C. model studio erected at the exhibition also attracted much attention.

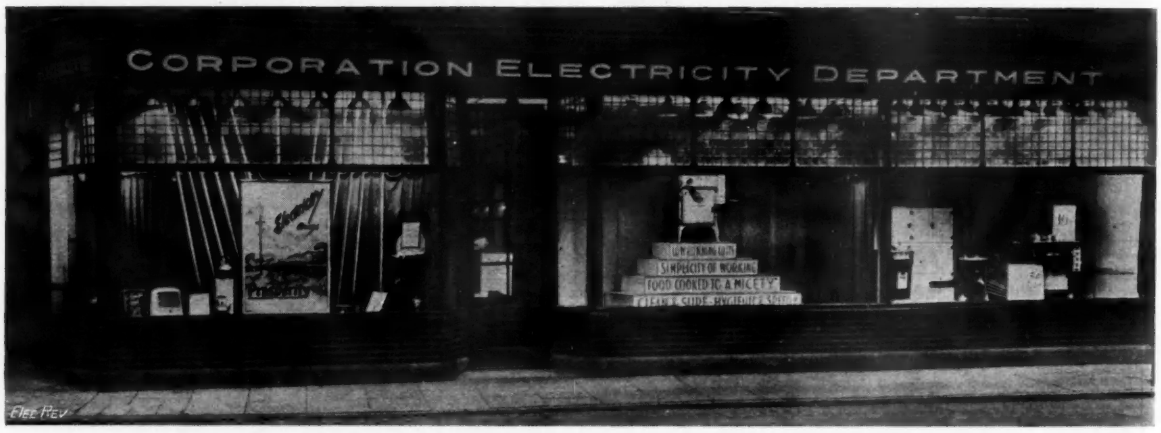
Among the exhibitors are: British Blue Spot Co.; Baker's Selhurst Radio; A. C. Cossor, Ltd., Jackson Bros.; Pye Radio, Ltd.; Britannia Batteries, Ltd.; Philco; Tekade & Eta; Regentone, Ltd.; Whiteley Electrical Radio Co.; Wingrove & Rogers; Impex Electrical, Ltd.; Lectro Linx, Ltd.; Varley (Oliver Pell Control, Ltd.); Zetavox Radio; Television, Ltd.; Kolster-Brandes, Ltd.; Lotus Radio, Ltd.; Oldham & Son, Ltd.; Mullard Wireless Service Co.; Ferranti, Ltd.; Majestic Electric Co.; the Marconiphone Co., Ltd.; and many other leading manufacturers.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Marking of Electrical Accessories

The Board of Trade gives notice that it has referred to the Standing Committee an application for an Order-in-Council to require the marking with an indication of origin of imported electrical accessories of the following descriptions:—Lampholders; switches up to and including 30-A rating; ceiling roses; cut-outs and fuses up to and including 30-A rating; wall sockets and plugs and plug adaptors up to and including 30-A rating; plugs and/or sockets for use as connectors up to and including 30-A rating; adaptors for lampholders; and switch plates. Those desiring to be heard in opposition at the public inquiry which will be held later by the Committee should communicate with the secretary, Mr. E. W. Reardon, Board of Trade Offices, Great George Street, S.W.1, not later than October 22nd.



The showrooms of the Grimsby undertaking whose extension is dealt with in this issue

The British Industries Fair

The electrical group at the next British Industries Fair at Birmingham (February 20th to March 3rd) will be thoroughly representative of most branches and larger than ever. Many entirely new features in power plant and accessories will be shown for the first time, and a typical grid sub-station will be on view. The application of electricity in its latest aspects in mines, on ships, for agricultural purposes and general industry, will be demonstrated, as well as the utilisation of electrical energy for water heating and steam raising, several new heaters of the electrode and immersion types being displayed. For use in tropical countries, very effective new insulating products have been specially prepared. In the metallurgical trades great advances have been made in electrical furnace practice, and there will be many notable exhibits of low-voltage welders, arc welders and spot welders. Tumbler switches and screw lampholders have been designed to conform to overseas standards in electrical accessories.

The " Ediswan " H.T. Battery Guarantees

Recent improvements in " Ediswan " h.t. radio batteries have made it possible for the Edison Swan Electric Co., Ltd., to offer both the dealer and the customer exceptionally comprehensive guarantees of good service. A six months' shelf life for every battery is guaranteed to dealers, who, by the way, are reminded of the " Dealers' Credit Bonus Scheme," which allows a credit bonus on all purchases of " Ediswan " batteries, torch cases and radio accumulators. A service form is now enclosed with every battery, and should any fault develop the company undertakes to deal with the customer's complaint within twenty-four hours of receipt of the defective battery; customers are asked to return defective batteries direct to the Ediswan Battery Service Department, Ponders End, Middlesex.

Emergency Lighting Installations

The last three cinemas erected by the Gaumont-British Picture Corporation, Ltd.—the Gaumont Palaces at Exeter, Taunton and Wolverhampton respectively—have been equipped with the " Keepalite " emergency lighting system. Orders have also been placed with the Chloride Electrical Storage Co., Ltd., for " Keepalite " equipments to replace other emergency lighting systems at the Scala, Leeds, and the Picture House, Glasgow. Other Gaumont houses equipped with " Keepalite " equipments are the Regal Cinema, Ipswich, the Rink Cinema, Smethwick, the Palladium Cinema, Southport, and the Gaumont Palace, Middlesbrough.

The Hart Accumulator Co., Ltd., has recently supplied a battery consisting of 100 " KB.5 " type cells, having a capacity of 50 Ah when discharged in ten hours, for the emergency lighting at the Cripplegate Theatre, London, E.C.

Wallasey Electricity Showroom Inquiry

The Ministry of Health is to hold a public inquiry at Wallasey into the proposal of the Corporation to erect a new electricity showroom and offices in Conway Street, Liscard. This has been a subject of controversy, much of it of an inter-departmental character, for a considerable period, as the Parks Committee on two occasions has refused to allow the site to be utilised for the purpose. Another section of the Council contends that there are many suitable business premises unoccupied in the borough and one of these could be easily adapted, without much expense, for the purposes of the Electricity Committee. Retailers of electrical appliances are also opposed to the proposal.

The North London Home-Lovers' Exhibition

The seventh annual North London Home-Lovers' Exhibition will open at the Alexandra Palace, on Wednesday next. More than 200 exhibitors will take part, and a striking new illumination scheme, utilising display and floodlighting most effectively, is provided for the two exhibition halls. A representative selection of modern labour-saving devices, radio apparatus, &c., will be shown, and two particularly interesting exhibits will be a model of an electrically equipped village and what is claimed to be the world's largest model electric railway.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable-making Industry announces that the September 1st cost-of-living figure is 41 per cent. above the 1914 level, and that this does not involve any alteration in wages on the third pay day in October.

The Scottish Ideal Home Exhibition

The Scottish Ideal Home Exhibition will be opened at Kelvin Hall, Glasgow, on Wednesday next, by the Lord Provost, Sir Thomas Kelly.

Radio Trade in Jugoslavia

A Department of Overseas Trade report on the market for radio apparatus in Jugoslavia says that competition by United Kingdom sets may be possible, but unless the quality is much better than those now on the market it is entirely a question of price, terms and long credit. The best way of marketing radio apparatus in Jugoslavia is by means of a general agency in Belgrade and Zagreb which is in touch with the retailers throughout the country.

The Invention of Chromium Plating

The U.S. Circuit Court of Appeals is reported to have recently upheld the claim of Dr. Colin G. Fink, professor of electrochemistry at Columbia University, to be the originator of chromium plating, sustaining an infringement decision at New Haven, Conn., in favour of the United Chromium Co. against the International Silver Co. The Court ruled that Dr. Fink was the originator of the chromium process, and not, as was claimed, the U.S. Bureau of Standards, the Eastman Kodak Co., or the Westinghouse Electric & Manufacturing Co.

Unfenced Machinery

The English Electric Co., Ltd., was summoned at Preston Police Court on September 21st for not fencing off dangerous machinery in its factory. It was stated that at the company's works in Strand Road there were six large traversers. On traverser No. 1, a brake-pedal had been mounted at a dis-

tance of only 11 in. from two exposed gear wheels forming part of the electrical propelling machinery. Following an accident caused by a man who when attempting to apply the brake put his foot into the gear wheels instead of on the pedal, a guard has since been fitted over the gear wheels. The company was fined £10.

The Approval of Appliances in Australia

The New South Wales Electrical Apparatus Safety Board has given notice that it has commenced operations in respect of the "hall-marking" of electrical and radio appliances, indicating that they have been inspected and approved for connection and use in compliance with safety requirements. Manufacturers, &c., are invited to submit their products to the board for inspection and tests regarding their safety qualifications and the right to use its hall-mark on these products. Further particulars may be obtained from the secretary to the board, Mr. A. F. O. Brown, 77, York Street, Sydney.

The constituent members of the board are the Chamber of Manufacturers of N.S.W., the Electrical Association of N.S.W., the Electricity Supply Engineers' Association of N.S.W., the Municipal Council of Sydney, the Municipal Council of Newcastle, and the Retail Traders' Association of N.S.W.

New Glasgow Electricity Showrooms and Offices

The new electricity showrooms and offices of Glasgow Corporation at 75, Waterloo Street, Glasgow, are to be formally inaugurated to-day.

Tenders for Swansea Plant

When the recommendation of the Swansea Electricity Committee that the Council should accept the tender of the English Electric Co., Ltd., for the supply of turbo-alternators to the new Tir John, Swansea, generating station, at a cost of £133,644, came before the council on September 21st, it was decided to defer consideration of the matter. It was pointed out that the members of the Council had only received the reports on the morning of the meeting, and had had no time to consider them adequately. A member suggested that it might be advisable to obtain a supplementary report from the consulting engineers giving in detail actual experiences in the United Kingdom in the manufacture of turbine machinery of the respective companies whose tenders were under consideration. The Council agreed that if this report could be obtained it would be advantageous. A similar course was adopted with regard to the tender for the supply of steam-raising plant to the Tir John Station by International Combustion, Ltd., at a cost of £238,450.

Henley Wiring in the Far East

Fine modern buildings continue to be erected in the Far East, in which the electrical work reaches a high standard. An interesting electrical installation is that in the warehouses of the Hong Kong and Kowloon Wharf and Godown Co., Ltd., of Kowloon. This installation, with 350 lighting points, is carried out with Henley twin c.t.s. wiring, four miles being used. The first complete installation carried out with c.t.s. cables was two years ago at the Kowloon landing stage at the Star Ferry. A great proportion of the wiring in this particular installation is exposed to severe climatic conditions. In spite of that, regular examinations have proved that the installation gives an insulation test equal to that taken when it was first put in. So satisfactory has this installation proved that during the past two years the Jardine Engineering Corporation has rewired, with similar Henley material and "Bakelite" fittings throughout, ten other godowns belonging to the company.

Other large buildings which have been wired with Henley cables are the Gloucester Building, Hong Kong, and the War Memorial Hospital, Mount Kellet.

Recent Contracts

Further orders have been placed with Messrs. Burne-Jones and Co., Ltd., for radio receivers for the use of the blind, and over 21,000 sets have been manufactured and distributed throughout the kingdom in connection with the British "Wireless for the Blind" Fund.

The Post Office Stores Department, which already has in service over 1,000 "Morris-Commercial" vehicles, has just placed a further order with Morris Commercial Cars, Ltd., for 173 vehicles. The new order is for eighty-five 15-cwt. vehicles and eighty-eight one-tonners.

A "Cosmos" Lamp Calendar

The Metropolitan-Vickers Electrical Co., Ltd., believes in being the first in the field with its new year's "Cosmos" lamp calendar. As our illustration shows, a charming young damsel makes an attractive subject for the new calendar, which provides daily slips with quotations and proverbs for the year, commencing October 1st.

The attractive new "Cosmos" calendar

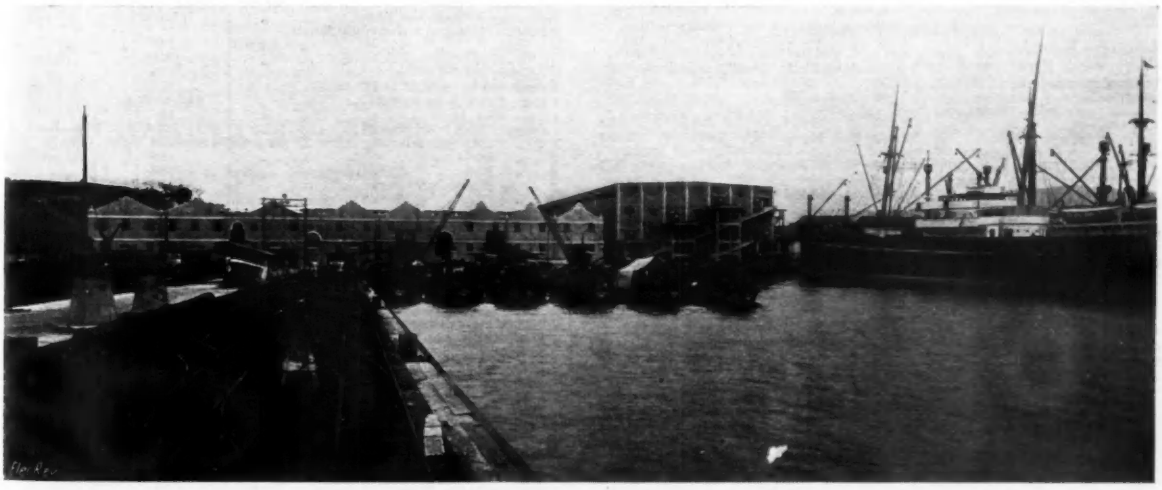
French Market for I.C. Engines

A report on the market for internal combustion engines in France has been prepared for the Department of Overseas Trade by the Commercial Counsellor to H.M. Embassy at Paris. This states that the demand for gas engines is not likely to expand largely on account of the steady electrification of most parts of France. There is reason to anticipate an increase in the demand for Diesel and semi-Diesel engines, but it seems doubtful whether in the present circumstances, with the "Buy French" campaign and the 15 per cent. surtax, United Kingdom manufacturers are likely to obtain many orders. In any case, the best-known English companies are already represented in France, and there would seem to be little room for newcomers.

Social Events

The G.E.C. Magnet Social Club's annual swimming gala was held on September 16th at the Holborn Baths. The programme provided a succession of thrilling finishes which testified to the good judgment of the handicapping committee. The winners of the open events (open to all London establishments) were as follows:—Sir Hugo Hirst Cup (men), seven lengths: Mr. V. Blake (Fraser & Chalmers). The Mrs. Leslie Gamage Cup (open) for the ladies' relay race: Head Office. The Mr. Leslie Gamage Cup for men's relay: Fraser & Chalmers. The prizes were presented by Mrs. Leslie Gamage.

The "Clesco" swimming club of the County of London Electric Supply Co., Ltd., held its sixth annual swimming gala at the Camberwell baths on September 17th. Among those present were Mrs. C. J. Brand, the wife of one of the directors of the company, Mr. J. C. Dalton, the manager and secretary, Mr. W. G. Allbright, Mr. A. R. Bacon, and Mr.



Warehouses at Kowloon wired with Henley c.t.s. cable

J. D. Dallas. The principal event of the evening was the race for the 160-yd. inter-district championship trophy. Six districts entered for this event, which was won by the head office. Features of the evening were displays of fancy and ornamental swimming. Mrs. Brand presented the challenge trophy to the winning team and distributed the prizes. During the events selections were played by the "Clesco" dance band.

Joint Showrooms at Coventry

An intimation has been received by the Coventry Corporation that the loan sanctions for the proposed gas and electricity showrooms will be issued in due course, and that in the meantime tenders may be invited for the work. The subject has been discussed by the Gas and Electricity Committees, which have decided to ask the City Council for authority to issue instructions for the preparation of the quantities.

The Brighton Exhibition

The Lighting, Heating, Electrical and Cooking Exhibition recently held at Brighton has resulted in a great increase in public interest in the domestic use of electricity, and from the manufacturers' point of view has proved very satisfactory. The G.E.C. electric kitchen attracted the attention of hotel proprietors and large caterers from a number of towns along the South Coast, the low cost of electricity comparing favourably with the charges of local gas concerns.

Trade Announcements

The British Electric Co. will shortly be taken over by Beco, Ltd. The managing director will be the present proprietor of the British Electric Co., Mr. H. A. Easter.

In future the sale of "Tricity Sunray" products will be controlled by Messrs. L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, Kingsway, W.C.2. (Temple Bar 5811.)

Messrs. J. Sawyer and J. J. Henderson, electrical engineers, of the Queen's Road Electrical Stores, 2a, Queen's Road, Southend-on-Sea, have taken additional premises at 17, Elmer Place, for use as works and testing rooms.

Messrs. Hildick & Hildick have opened a depôt at 39, Church Street, Birmingham, for the wholesale distribution of electrical conduits and fittings and all types of wiring accessories, lamps, &c.

The Taylor Stoker Co., Ltd., has removed its offices to Park House, Great Smith Street, S.W.1. (Telephone: Victoria 8152-3.)

Westinghouse Electric's Copper Purchases

The New York correspondent of the *Financial Times* reports that Mr. F. A. Merrick, president of the Westinghouse Electric and Manufacturing Company, has announced that the company has bought 4,000,000 lb. of copper "on the firm belief that business has turned the corner." He adds: "The world isn't finished. We see other opportunities to purchase materials and supplies at the present favourable price level."

Italian Foreign Electrical Trade

The appended table shows the Italian imports and exports of electrical machinery and apparatus during the six months ended with June last year, as compared with the first half of 1931. It will be seen that the imports show a decrease of £737,080, whereas the exports increased by £234,695.

	Imports. January–June.		Exports. January–June.	
	1931. Lire. Thousands omitted.	1932. Lire. Thousands omitted.	1931. Lire. Thousands omitted.	1932. Lire. Thousands omitted.
Accumulators and parts ...	4,138	575	1,796	1,103
Lamp bulbs	808	725	—	—
Electric measuring instruments	2,376	2,043	276	239
Radio apparatus	35,569	10,847	3,911	2,059
Telegraph and telephone apparatus	29,536	17,968	941	873
Miscellaneous electrical apparatus	24,394	23,991	6,782	17,406
Electric furnace and other carbons	4,378	3,148	278	165
Insulated cables	1,123	623	5,181	2,766
Electricity meters	2,290	1,841	277	287
Insulated wires	1,919	590	4,291	2,796
Generators, "without collectors"	6,744	4,618	1,207	3,603
Generators, "with collectors"	9,340	8,855	11,143	13,480
Glass and Porcelain insulators	324	186	586	825
Arc lamps	33	28	—	—
Incandescent lamps	6,523	4,008	3,039	953
Static transformers	2,937	2,678	1,755	10,880
Insulating tubes	44	1	151	21
Total	132,476,000	82,725,000	41,614,000	57,456,000
Converted at 67½ Lire to the £	£1,962,635	£1,225,555	£616,505	£851,200

Another Illumination Design Course

The following lectures are to be delivered in connection with the twenty-sixth Illumination Design Course to be held at 7.30 p.m. at the Lighting Service Bureau, 2, Savoy Hill, W.C.2. The names of those opening the discussions are given in parentheses.

October 10th. "Post-War Progress in Electric Lighting," by Mr. W. J. Jones, preceded by opening remarks by Mr. H. A. Lingard (chairman, E.I.M.A. Council). October 17th: "Lighting Opportunities in the Hotel," by Mr. R. O. Ackerley (Brig.-Gen. R. F. Legge). October 24th: "Good Quality Electric Lamps," by Mr. L. E. Buckell (Mr. H. T. Young). October 31st: "A New Outlook on Shop Lighting," by Mr. F. Marsh (Mr. R. Harman). November 7th: "The Economics of Industrial Lighting," by Mr. A. D. S. Atkinson (Mr. H. Murray). November 14th: "Floodlighting," by Mr. H. Lingard (Mr. P. Good). November 21st: "Architectural Lighting," by Mr. R. W. Maitland (Mr. J. C. Dalton).

Leicester Showroom Setback

The Ministry of Health has declined to sanction a loan for the erection of electricity offices in Charles Street, Leicester, as it is of opinion that in these times the scheme should be deferred.

Local Exhibition

The Dunoon Electricity Supply Co., Ltd., is holding an electrical exhibition in the Pavilion Hall during the last week in October.

The Edinburgh Radio Show

Three four-stage amplifiers, specially designed by the Edison Swan Electric Co., Ltd., will be used for supplying the music at the Edinburgh Radio Show, which will be held from October 12th to 22nd. These will be similar to the amplifiers installed recently at the White City Stadium, London. There will be approximately 120 loudspeakers in operation on the stand, the signal strength available for each stand being about 1½ watts. In addition four large speakers will be mounted in suitable positions in the hall.

Private Fire Brigade Competition

The private fire brigades of Standard Telephones and Cables, Ltd., won the first two places in the United Kingdom championship on September 24th. Their New Southgate factory team secured first place, thereby winning the Nestlé Cup, and their Woolwich factory brigade, who were the previous holders of the championship, came second only one-fifth of a second behind. Eighteen brigades participated in the competition, which was held in London, and 300 firemen were on parade. In the first division of London championship the brigades of Standard Telephones and Cables, Ltd., achieved further success. The New Southgate team won the Isaac Cup, coming second to the Midland Bank brigade, while the third place was secured by the Woolwich factory team. Eleven brigades competed.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, Etc.	Price Sept. 28th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£17	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£3 15s.	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d.	—
METALS, Etc.		
b Aluminium, Ingots ... ... per ton	£100 to £105	£5 inc.
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ... ,,	1/2 to 2/9	¼d. inc.
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£146	£7 inc.
Grade II ... ... ,,	£101	£1 inc.
Grade III ... ... ,,	£55	—
c Brass (rolled metal 2" to 12" basis)... per lb.	7¾d.	¼d. dec.
c ,, Tubes (solid drawn) ... ... ,,	9¼d. to 9¾d.	—
c ,, Wire, basis ... ... ,,	7¾d.	—
c Copper Tubes (solid drawn) ... ... ,,	10¼d.	—
g ,, Bars (best selected) ... ... per ton	£68	—
g ,, Sheet ... ... ,,	£68	—
g ,, Rod ... ... ,,	£68	
g ,, (Electrolytic) Bars ... ... ,,	£36 5s.	—
d ,, ,, Sheets... ... ,,	£64	—
d ,, ,, Wire Rods ... ,,	£42	—
d ,, ,, H.C. Wire ... per lb.	6 11/16d.	1/16d. dec.
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	5¼d.	¼d. dec.
i Iron, Pig (Cleveland No. 3) ... ... per ton	58/6	—
i ,, Wire, galve. No. 1, P.O. qual. ,,	£20	—
g Lead, English pig ... ... ,,	£14 15s.	10s. inc.
g Mercury ... ... per bot.	£9 7s. 6d. to £9 12s. 6d.	2s. 6d. dec.
e Mica (in original cases) small ... per lb.	6d. to 8/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1d.	—
p ,, ,, drawn bars & rods ,,	11d.	—
p ,, ,, rolled strip & sheet ,,	11d.	—
p ,, ,, wire ... ... ,,	1/-	¼d. inc.
o Platinum ... ... per oz.	£9 5s.	10/- dec.
d Silicium Bronze Wire... ... ... per lb.	8d.	⅛d. inc.
r Steel, magnet, in bars... ... ... ,,	7½d.	—
g Tin, Block (English) ... ... per ton	£152 10s. to £154 10s.	£3 5s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/1	—

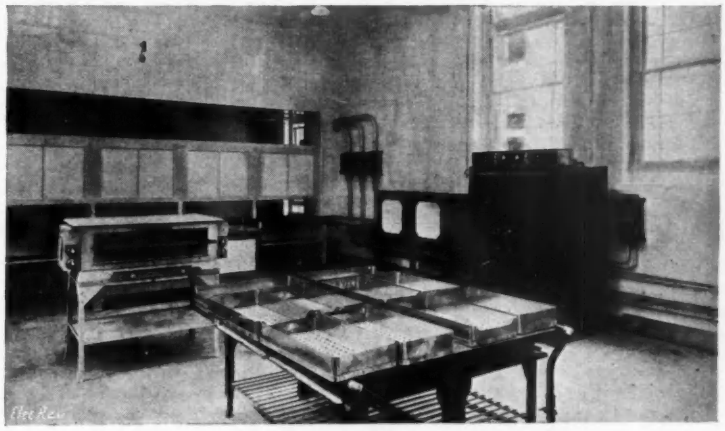
Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co. Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Orniston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

Electrical Equipment at Southend Hospital

A new general hospital has recently been completed at Southend-on-Sea in which electricity has been introduced on a very extensive scale. The special G.E.C. radio and amplifying equipment installed is designed to operate entirely from a.c. mains, and employs two receivers, an intermediate amplifier panel, and a 25-W a.c. power output panel; other panels provide for delayed switching, line distribution, and mains switching and fusing. The number of moving-coil loudspeakers installed is twenty, while the number of headphones in use at one time is in the neighbourhood of 200 pairs.

An important section of the general electrical equipment is that of the kitchen, in which a large proportion of the cooking apparatus installed has been supplied by the G.E.C. This kitchen caters for upwards of 300 persons daily, and includes a "Magnet" cabinet roasting oven, which is loaded to 12 kW, a 14-kW griller, and a two-pan fish fryer with canopy and draining rack. For the rapid serving of meals a fleet of "Magnet" electric food trolleys is provided. These are electrically heated from plugs in the servery, and at each halt to serve a meal, a plug is inserted in the nearest power socket so that all food is kept properly warm. The whole electrical installation in the hospital was carried out by Mr. G. A. Weston, 75, Milton Street, E.C., and the whole of the cables were supplied by Callender's Cable & Construction Co., Ltd.



"Magnet" cooking equipment at Southend Hospital

New Catalogues and Lists

Heyes & Co., Ltd., Water-Heyes Electrical Works, Wigan.—An enlarged edition of the "Wigan" and "Lacent" lighting fittings catalogue (No. F.3), announcing an increase in trade discount.

Rhodes, Brydon & Youatt, Ltd., Waterloo Engineering Works, Gorsey Mount Street, Stockport.—Booklet No. 137 relating to the use of "Fullway Mopumps" in forced circulation heating systems.

Hopkinsons, Ltd., Huddersfield.—List No. 3209, covering the company's valves for automatically controlling the temperatures of steam heated vessels, &c.

Standard Telephones & Cables, Ltd., Connaught House, Aldwych, W.C.2.—An illustrated brochure giving an account of the public address system used at the recent Eucharistic Congress in Dublin.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—An illustrated leaflet descriptive of "Britalux" cube lighting fitting.

J. H. Tucker & Co., Ltd., King's Road, Tyseley, Birmingham.—An abridged price list (No. G.16) of Tucker products. The introduction of a number of new lines is announced.

Skefko Ball Bearing Co., Ltd., Luton.—A revised general catalogue of SKF ball and roller bearings. An innovation is the thumb indexing system to facilitate reference.

John Spencer, Ltd., Globe Tube & Engineering Works, Wednesbury.—The company's new high pressure steam main catalogue containing fifty-two copiously illustrated pages.

Ferranti, Ltd., Hollinwood, Lancs.—Leaflets illustrating and describing "Ferranti" electric clocks and radiant fires.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—A broadsheet issued in connection with the twenty-first anniversary of the introduction of the "Henley" wiring system. Also catalogue No. U.E.11 dealing with a new range of outdoor termonal boxes.

Petters, Ltd., Westland Works, Yeovil.—A 172-page catalogue in which for the first time the company has brought together particulars of all its oil engines and aircraft products in one volume. The publication is bound in a strong leatherette cover and is profusely illustrated, every effort being made to produce a complete guide to the company's full range of products.

Austinlite, Ltd., Lighthouse Works, Smethwick, Birmingham.—An illustrated leaflet describing "Austinlite" electric lighting plants such as are installed in lighthouses, lightships, and lifeboats.

Bankruptcy Proceedings

E. P. P. Roberts, electrician, 63, Vicarage Lane, East Ham.—This debtor attended last week at the London Bankruptcy Court and passed his public examination upon accounts showing liabilities of £368 and assets of £7. Replying to the Official Receiver, the debtor said that he and a partner started business in 1927 as "Roberts & Parrish," electrical contractors, at the above address. The partner retired six months later and he (debtor) continued the business alone until December, 1931, when he closed down. He attributed his failure to lack of capital, the ill-health of his family, and trading on an insufficient profit margin.

M. Landau, wireless dealer, 66, 68 and 70, High Street, Camden Town, N.W.—The statutory first meeting of creditors was held on September 20th at the London Bankruptcy Buildings, when it was stated that the liabilities amounted to about £13,000 and the assets might realise between £1,400 and £2,000. The debtor attributed his insolvency to general trade depression, heavy bank and other interest charges, depreciation of his stock in trade, and heavy overhead expenses. It appeared that the Court had already made an order adjudging the debtor a bankrupt, and a resolution was passed for the appointment of Mr. W. A. J. Osborn, 119, Finsbury Pavement, as trustee of his estate.

J. I. Dangerfield (trading as "Dangerfields"), wireless, electrical, mechanical and motor engineer, 25, New Street, West Bromwich, Staffs.—The public examination was held recently at the Law Courts, West Bromwich. According to figures prepared the unsecured creditors' claims amounted to £1,274. Debtor attributed his failure to "insufficient capital, interest on loans, law costs, bad trade, inability to supervise business owing to illness, and depreciation of effects." The examination was adjourned in order that debtor might produce certain books of account.

J. F. Wisson, wireless dealer, 2, Cheapside, Deans Lane, Edgware.—The public examination was held last week at the London Bankruptcy Court, the accounts showing liabilities of £555 against assets of £94. The debtor attributed his insolvency to keen competition, undercutting, and heavy overhead expenses. The examination was concluded.

G. W. Mitchell, electrical engineer, 34, Locks Hill, Portslade.—Receiving order made September 16th on a creditor's petition.

E. E. Lucas, wireless and electrical engineer, 1a, Station Road, Plymouth.—Receiving order made September 16th on debtor's own petition.

F. O. Tosswill, electrical engineer, 60, Wodeland Avenue, Guildford.—First meeting to-day (Friday) at 29, Russell Square, W.C. Public examination October 4th at the Guildhall, Guildford.

E. Gould, electrical and radio engineer, High Street, Lee-on-Solent.—Public examination October 3rd at the Court House, St. Thomas's Street, Portsmouth.

R. E. Baxter, electrician and wireless dealer, 77, Hackthorn Road, Sheffield.—Public examination October 13th at the County Court Hall, Bank Street, Sheffield.

F. R. A. Lock and **V. C. Lock** (Lock Bros.), electrical engineers, Union Street, Stourbridge.—Public examination October 12th at the Court House, Hagley Road, Stourbridge.

L. G. H. Cantle, wireless engineer, Woodbury Cottage, Woodland Grove, Oatlands Park, Weybridge.—Trustee, Mr. H. Lever, 133, Finsbury Pavement, E.C., appointed September 15th.

F. W. T. Mussett (Ferensway Electrical Co.), electrician, 31, Spring Bank, Hull.—Receiving order made September 20th on debtor's own petition.

D. T. Donovan and **H. A. Langlois** (London Electrical Co.), electrical engineers, 119, St. Mary Street, Cardiff.—Last day for receiving proofs for dividend October 8th. Trustee, Mr. E. Owen, 34, Park Place, Cardiff, Official Receiver.

E. A. Blest, radio dealer, 71a, Halesowen Road, Old Hill.—Last day for receiving proofs October 8th. Trustee, Mr. A. M. Fairbairn, 1, Priory Street, Dudley, Official Receiver.

A. Whitelock, wireless dealer, Molthorpe.—Last day for receiving proofs for dividend October 8th. Trustee, Mr. D. S. Mackay, "The Red House," Duncombe Place, York, Official Receiver.

Company Liquidations

Bullphone, Ltd., wireless and electrical components manufacturers and dealers, Nightingale Works, New North Road, Barkingside.—The report of the Official Receiver has been issued, together with a summary of the accounts which shows total liabilities of £9,132 (ranking £6,797), assets of £2,334 (absorbed in debenture claims of £3,253), and a deficiency of £7,797 with regard to contributories. On May 27th last Mr. Victor L. Bell was appointed receiver and manager on behalf of the debenture holder. He has sold the business by private treaty for £1,500, and has realised £306 from other assets. A further £80 may come in on account of book debts, and in these circumstances there is no likelihood of a surplus being available for distribution amongst the unsecured creditors. The company's failure is attributed to the falling off in business to keen competition and to the slump in the wireless trade. Sir L. J. Coates has been appointed liquidator, with a committee of inspection.

Hanson Electrical Supplies, Ltd., 92a, Baker Street, W.—The accounts lodged under the compulsory liquidation of this company show liabilities of £1,684 and assets of £872, with a deficiency of £1,006 with regard to contributories, the issued capital amounting to £198. The Official Receiver reports that the company was promoted by E. G. W. Wallis and R. C. Redmond to carry on business as wholesale dealers in electrical equipment. In May last the Electric Lamp Factors, Ltd., pressed for payment of £100, and ultimately presented the petition upon which the winding-up order was made. The failure of the company is attributed to insufficiency of capital. Mr. G. A. Todd has been appointed liquidator with a committee of inspection.

Blackpool Radio Installation Co., Ltd.—Particulars of claims by October 8th to the liquidator, Mr. E. Rawcliffe, 29, Birley Street, Blackpool.

Winding-up Petition

Mechanism, Ltd.—A petition for the winding up of this company has been presented to the High Court by Messrs. Reid & Sigrist, Ltd., and will be heard in London on October 17th.

Electricity Supply

Lighting, Domestic, Power

Alton.—MAINS EXTENSIONS.—The Mid-Southern District Utility Co. has submitted plans to the Rural District Council for h.p. overhead lines at Golden Pot, Alton, and New Alresford, and l.p. lines at Shalden, Lasham, Medstead, East Woldham, Kingsley, Frensham, and Bentworth.

Australia.—BARRON FALLS SCHEME.—Preparatory work has been started on the construction of a headwork tunnel and power house in connection with the Barron Falls hydro-electric scheme. The scheme, which is estimated to cost £100,000, will have an initial capacity of 4,000 h.p., which will be increased to 6,000 h.p. when required. It is expected that supplies will be available for Cairns, and to within fourteen miles south of Gardonvale by the end of next year.

DEARER ELECTRICITY IN BRISBANE.—All domestic and industrial power charges in Brisbane have been increased by ¼d. per kWh, discount rates being reduced from 15 to 10 per cent. By this means the City Council expects to raise an additional £19,000 a year. The Queensland Government, however, proposes to introduce a Gas and Electric Light Bill with the object of reducing the price of these commodities.

Blaydon-on-Tyne.—OVERHEAD LINES.—The Urban District Council has approved plans submitted by the County of Durham Electrical Power Distribution Co., Ltd., for l.p. overhead lines at Lintzford Village and at Shibdon Farm Estate, Back John Street, George Street and Edward Street, Blaydon.

ELECTRIC COOKER PROPOSAL FOR COUNCIL HOUSES.—The question of installing electric cookers in houses being built on the Urban District Council's housing estate is to be considered by the Housing Committee.

Bradford.—CHEAPER ELECTRICITY.—The Electricity Committee has approved an all-round reduction in charges for electricity. It is estimated that the change will cost the Department £36,000 during the remainder of the working year. The principal alterations are:—Lighting flat rate, from 7d. to 5d. per kWh; supplies to churches, chapels, &c., from 5d. to 4d. per kWh; special rate for theatres, cinemas, &c., from 4d. to 3½d. per kWh; domestic rateable value tariff, from 17½ to 15 per cent. per annum, plus the existing "unit" charge of 1d. Power charges were reduced some little time ago, but it is proposed to increase the scale of discount; the standing charge is to be reduced, and there will be an extension of the privileged use of lighting at power rates. The scope of the rate for heating, ventilating and cooking purposes is to be extended to include supplies for accumulator charging and for refrigerators, and the price for these classes of supplies is reduced from 1d. to ¾d. per kWh. Reduced working expenses owing to the operation of new plant and a steady increase in consumption have made the reductions possible.

Brynamman.—SPECIAL ORDER.—The Brynamman and District Electric Supply Co., Ltd., is to apply to the Electricity Commissioners for a Special Order authorising it to extend its area of supply so as to include a part of the parishes of Llandilo and Bettws.

Buckinghamshire.—ELECTRICITY SCHEME COMPLETED.—The Wessex Electricity Co. has completed a scheme for supplying Stokenchurch, Lane End, Bolter End, and Cadmore End. The company is offering, for a limited period to householders on the contract rate, to install free of charge three lighting points with pendants, lamps, and shades, and one plug point, with free connection to the supply main where the service cable required is of normal length. Over 200 householders have accepted the offer.

Chichester.—MAINS AND SERVICES.—The City Council has applied for sanction to a loan of £10,000 for mains and services. Applications for a supply to Salt Hill, Bracklesham, and Appledram are to be acceded to provided the applicants enter into the usual guarantee.

COUNCIL NOT TO SELL UNDERTAKING.—The Electricity Committee has decided against the sale of the undertaking to the Mid-Southern District Utility Co.

Croydon.—L.J.E.A.'s APPLICATION TO COMMISSIONERS.—The Electricity Committee reports that a communication has been received giving notice that the London & Home Counties Joint Electricity Authority has made representations to the Electricity Commissioners that an Order should be made to provide for the transfer to the Authority of the compulsory purchase rights in the East Surrey (No. 2) distribution area (which includes the area of the Croydon Rural Lighting Order, 1905). The Committee recommends that steps should be taken to protect the Corporation's interests.

MAINS EXTENSIONS.—The Electricity Committee proposes to apply for sanction to a loan of £50,000 for mains extensions.

Dollar.—STREET LIGHTING SCHEME.—The scheme for illuminating the streets has now been arranged, and electric lighting will soon be available in the main parts of the town. At the more important parts arc lamps have been erected.

Dorchester.—TWO-PART ELECTRICITY TARIFF.—The Town Council has approved a report of the Electricity Committee with regard to a two-part tariff. The matter is to be discussed with the Electricity Commissioners.

Dover.—BULK SUPPLY TO BE TAKEN.—Although the Central Electricity Board has declined to make any reduction in the charge of £3 15s. 6d. per kW for a bulk supply the Town Council has decided to take the necessary steps for taking a supply.

Dundee.—NEW SUB-STATION.—The Electricity Department has decided to erect a new sub-station in the Hilltown area at a cost of £2,410.

Dunoon.—PROGRESS OF EXTENSIONS.—The extension of the area of the Dunoon and District Electricity Supply Co., Ltd., covering an additional fifteen miles of neighbouring territory, is well in hand, and electricity supplies will shortly be available in the villages of Andnadam, Sandbank, Kilmun, Strone, and Blairmore on the shores of the Firth of Clyde. Highly satisfactory progress by the contractors, Messrs. Johnson & Phillips, Ltd., is reported, and the supplies are expected to be available in some of the sections within the next three weeks.

East Ward (Westmorland).—THE ELECTRICITY SCHEME.—At a recent meeting of the Rural District Council it was stated with reference to the electricity scheme that the Electricity Commissioners were pressing for the matter to proceed. Steps are being taken to form a limited company, and the scheme will go forward very shortly.

East Westmorland.—PROSPECTS OF A SUPPLY.—The Rural District Council has been informed with regard to the electricity scheme for the area, that the Electricity Commissioners are pressing the matter forward, and steps are being taken to form a limited company. It is anticipated that work will be commenced soon.

Edinburgh.—NEW SUB-STATIONS.—At the Dean of Guild Court last Friday the Corporation was granted permission to erect three sub-stations.

Galloway.—CONTRACT PLACED FOR POWER SCHEME.—A contract valued at £80,000 in connection with the Galloway water power scheme under which five hydro-electric stations are being constructed in the south-west of Scotland has been placed with Messrs. William Taylor & Son (Glasgow), Ltd. The work involved in the contract includes foundations and steel work for the largest of the power stations to be constructed at Tongland, Kircudbright, and the contract will provide employment for 200 men for two years. Work is already in hand on the concrete dam for the Tongland station, where electrical equipment will comprise three generating units, each of 11,000 kW, now being built at the works of the English Electric Co., Ltd.

Garstang.—ELECTRICITY SUPPLY PROGRESSES.—Good progress is being made with the supply of electricity to Garstang, and the Council has given approval to plans for the overhead and underground mains.

Glenfarg (Perthshire).—STREET LIGHTING.—The Council is making arrangements to light the village roads by electricity from the Grampian scheme.

Grays.—REDUCTION OF CHARGES.—The Urban District Council has reduced the maximum demand charge for the two-part tariff for business premises from 50s. per kW per quarter to 40s., and the electrical engineer is to report with a view to making reductions in the charges under other tariffs.

Grimsby.—MAINS EXTENSIONS.—The Electricity Committee is to apply for sanction to a loan of £38,750 for mains extensions.

Lichfield.—THE SUPPLY TO ELMHURST.—The Town Council has received sanction to a loan of £710 for the extension of the supply to Elmhurst.

London.—POPLAR.—The borough electrical engineer recommends the replacement of turbine blading with rustless steel at an estimated cost of £2,100.

FULHAM.—The Electricity Committee reports that the present schedule of prices payable to contractors for the wiring of consumers' premises under the domestic rental wiring schemes was fixed some eighteen months ago. There has since been a considerable decrease in the cost of wages and materials, and it is therefore proposed to fix a new schedule of prices for this work. As a basis for the new prices quotations have been obtained from contractors, and the Committee will report upon them at the next meeting of the Council.

ST. PANCRAS.—The Electricity and Public Lighting Committee recommends that installation of prepayment meters for ordinary consumers, calibrated at 4d. per kWh, in cases which the borough electrical engineer approves.

The Highways Committee has adopted a scheme for the erection of eighteen columns with 300-W lamps fitted with a special type of reflector in Camden Road at a cost of £588.

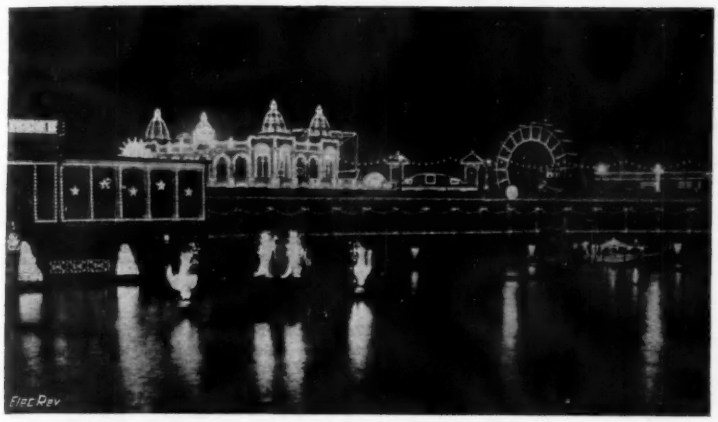
STOKE NEWINGTON.—The Electricity Committee is to apply for sanction to the borrowing of £5,000 for meters, and £5,000 for free wiring installations.

BATTERSEA.—The Borough Council has received sanction to a loan of £3,955 for the erection and equipment of a sub-station on the St. John's College Estate. The Electricity Committee proposes to provide services to 271 premises at an estimated cost of £2,416.

HAMMERSMITH.—The Borough Council has received sanction to a loan of £41,022 for mains and services.

Luton.—EXTENSIONS.—The Town Council has decided to apply for sanction to a loan of £37,675 for extensions to transmission lines and distribution cables to give supplies to

certain villages in Bedfordshire, as follows:—20,000-V ring main from Westoning *via* Flitton, Silsoe, Gravenhurst, Shillington, Higham Gobion, Barton, and Stopsley to generating station, £18,457; supplies for Flitton and Greenfield (£1,729), Pulloxhill (£1,032), Silsoe (£1,168), Gravenhurst (£619), Shillington (£3,316); Lower Stondon (£2,248), Streatley (£1,871), Higher Gobion (£244), Barton (£2,056), Soulbury and Stoke Hammond (£1,109); switchgear, £1,486; transformers, £1,210. Consent is also to be sought from the Ministry of Transport to erect overhead lines. Permission has been received to place overhead transmission lines in the rural districts of Ampthill, Eaton Bray, Luton, and Wing.



The annual illuminations which were switched on at Blackpool last Saturday are more impressive than ever. Over 200,000 lamps are employed and for the first time since the illuminations were organised eight years ago the new Promenade at South Shore is included in the scheme, bringing the total length to five miles. The scheme has cost £14,000 and during the month's display 300,000 kWh of electricity will be consumed

Manchester.—BOILER REPLACEMENT.—At the October meeting of the City Council a recommendation will be submitted for the acceptance of the tender of Messrs. John Thompson (Wolverhampton), Ltd., for the installation of two water tube boilers, two ash-handling plants, economisers, and structural alterations at the Stuart Street generating station. The new boilers will replace eight that were installed as long ago as 1902. The cost of the work is estimated at £75,000.

APPLICATIONS FOR SUPPLIES INCREASE.—In the first five months of this year 15,250 applications for supplies were received—nearly double the number in the corresponding period of 1930.

Newcastle-upon-Tyne.—ELECTRICITY CHARGES.—A deputation of the City Council is to wait upon the Newcastle-upon-Tyne Electric Supply Co., Ltd., to discuss the question of a reduction in electricity charges.

Northallerton.—RE-WIRING OF COUNTY HALL.—The North Riding County Council has agreed to re-wire the older portion of the County Hall at a cost of £285.

Oxford.—CHEAPER ELECTRICITY OUTSIDE THE BOROUGH.—The Oxford Electric Co., Ltd., has reduced the charges for electricity in its supply area outside the borough. The rate for domestic purposes is reduced to 6d. per kWh, and there is a sliding scale based on the number of rooms. For a four-roomed house during the winter quarters 34 kWh will be charged at 6d., the next 350 kWh at 1½d., and beyond at 1d. The scale rises until in the case of houses of over fifteen rooms the energy chargeable at 6d. increases to 230 kWh, and that at 1½d. to 750 kWh. There are two tariffs for business premises, a standing charge of 7s. 6d. per quarter per 100 W of installed lighting capacity with a "unit" charge of 1½d., or a flat rate of 6d. per kWh, with a scale rate for heating and other purposes. For other premises there is a flat rate of 6d. per kWh, with a charge of 2½d. per kWh for heating up to 250 kWh in the winter quarters and up to 100 kWh in the summer quarters, and 1½d. per kWh beyond. Tariffs for motive power vary between 2½d. and 1½d. per kWh, according to the quantity consumed.

Pinchbeck West (Lincs).—RESULT OF PETITION.—Following the receipt of a petition for a supply of electricity from the Parish Council Spalding Urban District Council has replied that the estimated cost of providing a h.p. line and distribution cables from Pinchbeck to the premises of the petitioners would be £4,048, which would mean that each petitioner would have to provide a guarantee of a sum of nearly £16 per annum for three years at least, and in addition meet the cost of the service line to his own property. It was added that the number of consumers would have to be substantially increased before the scheme became practicable. These figures were calculated on the basis of the fifty-two persons who had signed the petition.

Rawtenstall.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to the borrowing of £24,300 for plant, switchgear, cables and buildings.

STREET LIGHTING.—There are now only eighty-seven street gas lamps in the borough and the lighting superintendent has been authorised to proceed as far as possible with their conversion to electricity.

Southend-on-Sea.—HEATING OF PIER PAVILION.—The Town Council has authorised the borough electrical engineer to install a panel and tubular heating system at the Pier Pavilion at an estimated cost of £575.

Stirling.—ALLOCATION OF ELECTRICITY DEPARTMENT'S SURPLUS.—The Town Council at a recent meeting discussed the allocation of the surplus from the electricity undertaking. The Electricity Committee recommended that £572 should be applied towards the relief of the rates and that £285 should go to the sinking fund. This was opposed, and it was urged that the money should be utilised to reduce the cost of electricity from 4d. to 3½d. per kWh. It was contended, on the other hand, that any loss in connection with the undertaking in the past had been borne by the ratepayers and that the ratepayers were now entitled to a little relief. The recommendation was approved.

METER RENT PROPOSAL.—The Town Council has referred to the Electricity Committee for consideration the reduction or abolition of meter rents.

Sudbury.—A SUPPLY AVAILABLE.—A supply of electricity has been given to the parish by the Derbyshire and Nottinghamshire Electric Power Co., overhead lines having been extended from Spondon.

Swansea.—INSPECTION OF TIR JOHN NORTH STATION.—The Town Council last week inspected the works at Tir John North where the new generating station is being built, and several members descended a shaft 100 yards deep in a cage and walked along the portion of the tunnels that are being excavated for the purpose of bringing and discharging the cooling water from and to the King's and Queen's docks respectively.

Weston and Southwell (Dorset).—SUPPLY INAUGURATED.—An electricity supply was recently made available for Weston and Southwell.

Winchester.—OVERHEAD LINES ENQUIRY.—A Ministry of Transport inquiry was conducted on September 22nd by Col. Gordon Tucker into the Central Electricity Board's application for permission to erect transmission line towers through a portion of the New Forest. It was stated on behalf of the Central Board that it was proposed to erect nineteen pylons, and that the scheme affected the New Forest just under three miles out of about 34. The pylons would be chiefly on low ground, and for most of the way would be invisible from the main road. The proposal was opposed by the New Forest Association, which claimed that it would spoil the amenities of the district. The inquiry was concluded.

Wolverhampton. — MAINS EXTENSIONS. — The Electricity Committee is to apply for sanction to a loan of £25,000 for mains extensions.

The new central lighting system recently installed in one of the main streets at Clacton-on-Sea

FRINGE ORDER.—Application is to be made for a Fringe Order to enable the Corporation to supply electricity to Broctoon Grange, Sheriff Hales.

FACTORY SUPPLIES.—Arrangements have been made with Messrs. Bayliss, Jones & Bayliss, Ltd., for the Electricity Department to supply the whole of the electricity required at their works at Monmore Green.

Traction

Continental.—BELGIUM.—Experiments are to be made by the Belgian State Railway Exploitation Co. with a new 400-h.p. Diesel-electric rail coach capable of accommodating 200 passengers.

HUNGARY.—With the electrification of a section of railway between Budapest and Komorn, the 167½-mile electrically operated line from Budapest to Vienna will be completed. The journey between the two capitals will take 3½ instead of 4½ hours.

GERMANY.—It is stated that between 1925 and the end of the current year the Reich Railway Co. will have expended 190 million marks on the conversion of steam lines to electric traction. This amount does not include the outlay on rolling stock which includes over 500 locomotives. This number will now be increased by the State expenditure for providing work, as two million marks of the total provision for this purpose is intended chiefly for the ordering of further electric locomotives.

Dewsbury.—BUSES TO REPLACE TRAMS.—The Dewsbury and Ossett Town Councils have under consideration a proposal of the National Electric Construction Co., Ltd., which owns the Dewsbury, Ossett and Soothill Nether Tramways, to substitute buses for the tramway system.

Durham.—TRAFFIC SIGNALS.—The City Council has received sanction to the erection of automatic traffic signals at Claypath, Gilesgate, and the North Road.

Glasgow.—BOW COLLECTOR SCHEME ALMOST COMPLETED.—The £20,000 scheme of the Transport Department for the abolition of the overhead trolley in favour of the Fischer bow collector on tramcars has been almost completed. Over 800 trams have been fitted with the new apparatus, and it is expected that all the vehicles in service will be equipped within a few weeks. Mr. Jules Fischer, the chief electrical engineer of Budapest, who is the inventor of the bow collector, recently visited Glasgow to examine the progress which had been made with the change-over. He said that the bow collector had been adopted in Budapest, Leipzig, Vienna, and other cities in Southern Europe since the War. He predicted that its operation in Glasgow would mean speedier, smoother, and quieter running of the tramcars, while it would ensure continuous contact between the tramcar and the overhead wire. This would prevent delays at crossings caused by the derailing of the trolley wheel, and also make it possible for the tramcar to be illuminated continuously at the termini on dark evenings. Perhaps the best result of all, said Mr. Fischer, would be that the bow collector should be able to eliminate all tramway interference with radio transmission and reception. The bow collector prevents this disturbance, as has been proved in Budapest and Vienna and other cities where it is now in use. Mr. Fischer is also visiting Aberdeen, Edinburgh, Dundee, Birmingham, Blackpool and London before he returns to Budapest. Sunderland has changed over completely to the bow collector.

Japan.—THE TOKYO UNDERGROUND SYSTEM.—The Tokyo Rapid Transit Co. (in process of formation, with a capital of 30,000,000 yen) has applied for permission to take over from the Tokyo Municipality the latter's chartered underground lines. Some forty leading business men are interested in the enterprise, and it is expected that the railway authorities will grant the application.

Leeds.—LOUDSPEAKERS ON BUSES.—To announce the approach of stopping places on dark nights a bus at Leeds has been fitted experimentally with a loudspeaker which can be operated from a microphone by the conductor on the platform.

L.M.S. RAILWAY.—SUCCESS OF UPMINSTER EXTENSION.—Over 133,000 passengers used the newly electrified extension line from Barking to Upminster during the first week of its being open for traffic. This figure does not include the number of passengers using Barking station, but refers to the stations from Upney to Upminster inclusive. Electric services were brought into operation on September 12th, and in addition to catering for new residential districts will relieve the existing Southend steam trains of a large amount of intermediate traffic.

London.—MOTOR DIRECTION INDICATORS.—In view of recent developments the Minister of Transport has, as a matter of urgency, asked the Departmental Committee on Traffic Signs, which is at present sitting, to advise him whether the time has arrived when he should make regulations on the subject of direction indicators on motor vehicles, and, if so, as to the form which such regulations should take.

AMBULANCE CALL POSTS.—The City Corporation recommends the installation of signal kiosks and visual signs upon the ambulance call posts in the city at a cost of £1,230.

Rawtenstall.—TICKET-ISSUING MACHINES.—The Transport Committee has asked the general manager to consider as to the advisability of obtaining machines for the issue of tram and bus tickets.

Southern Railway.—THE BRIGHTON ELECTRIFICATION SCHEME.—Sir Herbert Walker, general manager of the Southern Railway, has informed the Brighton Town Council that it is hoped to inaugurate the new main line electric service between London, Brighton, Hove and Worthing on January 1st next. The first section of the line from London as far as Three Bridges was opened on July 17th, and it was estimated originally that the complete scheme would not be in operation until next March.

Communications

Australia.—BROADCASTING PLANS.—The Federal Government proposes to construct eight additional broadcasting stations. Each will cost about £20,000, and two will probably be in Tasmania. When they are completed it is stated by the Postmaster-General that approximately 95 per cent. of the population of Australia will be within reach of a first-class broadcasting service.

Birmingham.—EXTENSION OF THE AUTOMATIC SYSTEM.—A large extension of the Birmingham automatic system will take place next month when the Tipton, Black Heath, Broadwell, and Stone Cross exchanges are transferred to automatic operation. The new exchanges are complete and the final tests are now being carried out.

Cullercoats.—MARINE RADIO STATION.—A new wireless coast station is nearing completion at Cullercoats (Northumberland) and is expected to be put into operation soon. The steamer Hauxley (Broomhill Steamship Co., Newcastle) is the first northern ship to be fitted with a wireless telephone system. By means of these wireless telephone systems which are being installed by the Marconi International Marine Communication Co., it is possible for a ship in British waters to communicate with its owners, through the coast stations, within two or three hundred miles of the coast.

Great Britain.—RELAY EXCHANGES.—Sittingbourne and Milton Regis Urban District Council has refused an application by the National Broadcast Relay Co. for permission to establish a relay service for the town. The Council has already granted permission to another company.

The request of Broadcast Listeners' Service, Ltd., for the permission of Greenock Corporation to establish a local service has been refused.

Faversham Town Council has refused an application from a relay company as a service has already been provided by the Kent Relay Wireless Co. The Council has agreed that the Kent Relay Co. shall operate for ten years, whether the Kent County Council withdraws its consent in the meantime or not.

The Edward Prior Electric Co.'s application to the Horsham Rural District Council for permission to establish a service at Crawley was referred to the Crawley and Ifield Parish Councils, which decided that the service would be detrimental to the town.

Christchurch Town Council has declined to allow the New Forest Broadcast Service to establish an exchange in the borough on the ground that local radio dealers would be adversely affected.

Three firms have applied to the Chichester City Council for permission to establish a service for the city.

The Lowestoft Highways Committee has agreed to grant permission to Messrs. Durrant & Mayment for the establishment of a relay exchange for a period of five years, subject to a payment to the Council of 2s. 6d. per annum for each subscriber.

Lerwick.—EMERGENCY P.O. RADIO.—Permanent aerials have now been erected at Lerwick Post Office and a radio installation will be used during emergencies when the cables to the mainland are out of action. There should, therefore, be no risk of the islands being isolated in the future.

London.—RADIO FOR POLICE USE.—Satisfactory tests were carried out last week by Home Office experts with portable radio sets designed for the use of police patrols, and it is anticipated that before very long a scheme will be submitted to the Government for the equipment of all mobile police—and perhaps later policemen on foot—with radio receiving apparatus.

Poland.—NEW SUBMARINE CABLE.—The Polish authorities are preparing a plan for the establishment of a submarine cable connection with the northern countries so as to be able to get direct communication and thus avoid the German lines. The proposal takes the form of the laying of a cable from Gydnia to Bornholm, whence the traffic would be continued by way of the cables which lie between Bornholm and Denmark and Sweden.

Russia.—RADIO FOR SCHOOLS.—From Moscow it is reported that the Soviet authorities are arranging for the installation of radio receiving equipment in no fewer than 2,335 schools in the country during the current year.

Ulster.—NEW BROADCASTING STATION.—The British Broadcasting Corporation has decided to build a high-power transmitting station within a few miles of Belfast. The new transmitter will have a considerably higher power than that of the present station. A. B.B.C. engineer has arrived in Belfast to carry out a survey of suitable sites for the new station, the geographical position of which will be determined with a view to giving an improved service.

Wolverhampton.—NEW TELEPHONE EXCHANGE.—New automatic telephone exchanges, whose 6,000 lines of equipment were manufactured and installed for the General Post Office by Standard Telephones & Cable, Ltd., were brought into service on Saturday last, September 24th. The automatic area comprises one main exchange with 3,100 lines at Wolverhampton, where sixteen manual operators' positions are provided in addition, and five satellite exchanges. These satellite exchanges are Bilston, 700 lines; Falling Park, 400 lines; Finchfield, 200 lines; Penn, 900 lines, and Tettenhall, 700 lines.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—SYDNEY.—October 24th. Department of Public Works. Auxiliary hydro-electric plant for Hume Reservoir. (A.X. 11487.)*

MELBOURNE.—November 22nd. Post and Telegraph Department. Accumulator cells and batteries. (A.X. 11491.)*

December 6th. Submarine telephone cable. (A. 11511.)*

Ayr.—October 8th. County Council. Electrical work at the Kilmaurs housing scheme. Mr. William Reid, architect, 14, Wellington Square, Ayr.

Belgium.—SCHAERBECK.—October 6th. Hotel Communal. 5,000 metres of l.p. and 1,000 metres of h.p. armoured cables. Caisse du Service d'Electricité, Hotel Communale, Schaerbeck (fee, 10 francs).

Birkenhead.—October 4th. Mersey Railway Co. Electrical sundries, metallic and carbon filament lamps and fittings. Mr. J. W. Shaw, general manager and secretary, Central Station, Birkenhead.

Blackburn.—October 24th. Corporation. E.h.p. metal-clad compound filled switchgear. (See this issue.)

Cheadle & Gatley.—October 14th. Electricity Department. 350-kVA transformer switch and distribution kiosk sub-station. (See this issue.)

Cleethorpes.—October 10th. Urban District Council. H.p. feeders, l.p. cables, switchgear, service boxes, prepayment meters, cut-outs, &c. (September 23rd.)

Croydon.—October 3rd. Corporation. Traffic control signals. Borough engineer, Town Hall.

Dagenham.—October 8th. Urban District Council. Electric lighting and heating installation at salvage plant site. (See this issue.)

October 7th. Traffic control system, Chadwell Heath. Engineer and surveyor, Council Offices, Becontree Avenue (deposit £1 1s.).

Farnworth.—October 10th. Electricity Department. L.p. cables. (See this issue.)

Glamorgan.—October 8th. County Mental Hospital Committee of Visitors. Wiring and fittings for lighting and power at new admission block, convalescent home, nurses' hostel and medical officer's residence at Penyfai. (September 23rd.)

Glasgow.—October 3rd. Corporation. Electric lighting installation at the East Keppoch housing scheme and hostel. General manager, Electricity Department, 75, Waterloo Street.

Grimsby.—October 7th. Electricity Department. L.p. cables. (See this issue.)

India.—NEW DELHI.—December 5th. Indian Stores Department. A.c. ceiling fans. (A.X. 11461.)*

October 25th. Bare copper conductors. (G.X. 11840.)*

October 31st. A.c. and d.c. house service meters. (A.X. 11517.)*

SIMLA.—India Store Department. November 7th. Electric bulbs for signalling lamps and torches. Director-General, India Store Department, Belvedere Road, S.E.1 (deposit 5s.).

November 14th. Inert cells and dry batteries. Director-General (deposit 5s.).

London.—STEPNEY.—October 10th. Electricity Department. L.p. switchgear for Limehouse generating station. (September 23rd.)

LONDON AND HOME COUNTIES JOINT ELECTRICITY AUTHORITY. October 8th. General electrical accessories. (September 23rd.)

FULHAM.—October 29th. Electricity Department. Condensing plant, &c. (See this issue.)

Manchester.—October 7th. Electricity Department. Water-heaters. (See this issue.)

Singapore.—October 20th. Municipal Council. Electrically driven pumps. (G.X. 11874.)*

South Africa.—JOHANNESBURG.—October 27th. City Council. Three-phase h.p. switchboard cubicles. (A.X. 11485.)*

October 20th. Automatic traffic signals. (A.X. 11510.)*

October 20th. Electric cable. (A.X. 11501.)*

November 11th. South African Iron & Steel Industrial Corporation, Ltd. Fuel-handling plant for Pretoria steelworks power station. (A.X. 11513.)*

DURBAN.—October 28th. City Council. 6,600-V metal-clad switchgear. (A.X. 11500.)*

November 4th. Pilot and telephone cable. (A. 11514.)*

CAPETOWN.—November 16th. Electricity Department. Transformers. (A. 11512.)*

Turkey.—ISTANBUL.—October 19th. Department of Posts, Telegraphs and Telephones. 40,000 metres of cable. (A.X. 11493.)*

Twickenham.—October 6th. Town Council. Electrically driven sewage pumping machinery and equipment with automatic control. Borough engineer and surveyor, Municipal Offices (deposit £2 2s.).

Uruguay.—MONTEVIDEO.—November 1st. 500,000 metres of Hackenthal type insulated wire, comprising equal quantities of 16 and 20 mm. wire. (A.X. 11509.)*

Wanstead.—October 6th. Urban District Council. Traffic control signals. Council's Offices, Wanstead Place, E.11.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Angus.—Public Health Committee. Accepted. Electric lighting at Birkhill housing scheme.—J. A. Hackney.

Faversham.—Town Council. Accepted. H.p. switchgear (£1,100).—A. Reyrolle & Co., Ltd.

Gravesend.—Town Council. Accepted. Electrically driven pumping equipment for the sewage disposal works.—Blackstone & Co., Ltd.

Greenock.—Corporation. Accepted. Electric lighting at housing scheme.—F. McCready.

Kettering.—Urban District Council. Accepted. Replacement of positive battery plates.—Tungstone Accumulator Co.

Leicester.—Electricity Committee. Accepted. Provision of coal de-dusting plant at the power station (£3,795).—Newton Chambers & Co., Ltd.

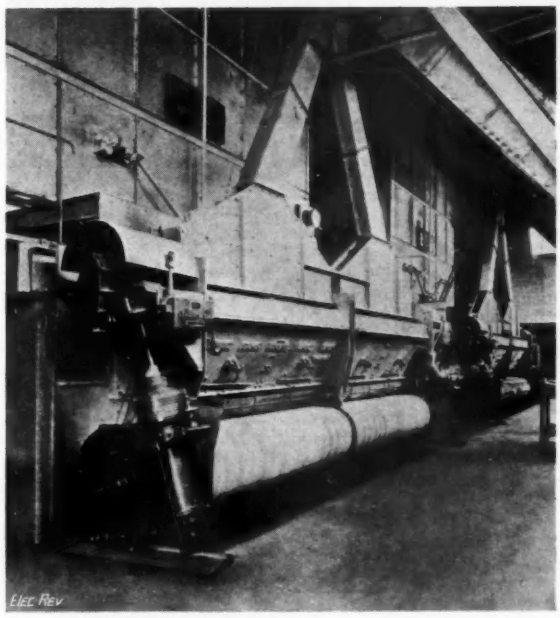
Sanitary Committee. Accepted. Four two-ton electric refuse collection vehicles (£592 each).—Electricars, Ltd.

London.—CITY CORPORATION.—Recommended. Installation of public address system at Guildhall (£330).—Standard Telephones & Cables, Ltd.

GREENWICH.—Health Committee. Recommended. Automatic refrigerating plant for mortuary (£277).—British Automatic Refrigerators, Ltd.

BATTERSEA.—Electricity Committee. Recommended. Supply and erection of transformer kiosk with h.p. and l.p. switchgear (£373), and replacement of three h.p. transformer switches at premises of the Projectile & Engineering Co., Ltd. (£158).—Ferguson, Pailin, Ltd. Two induction regulators (£266).—Switchgear and Cowans, Ltd.

HAMMERSMITH.—Electricity Committee. Accepted. H.p. cable (£144).—Metropolitan Electric Cable & Construction Co., Ltd. Cable for "North Pole" sub-station (£484).—Standard Telephones & Cables, Ltd. Switchgear for "North Pole" sub-station (£673).—A. Reyrolle & Co., Ltd.



The new boiler plant at Grimsby (see page 456)

BERMONDSEY.—Electricity Committee. Accepted. Feeder panel (£73).—Crompton Parkinson, Ltd.

STOKE NEWINGTON.—Highways Committee. Recommended. Vehicle-actuated traffic signals (£663).—Automatic Electric Co., Ltd.

HACKNEY.—Public Libraries Committee. Recommended. Rewiring of electric lighting installation at the Central Library (£219).—A. R. Camidge & Co., Ltd.

Manchester.—Electricity Committee. Recommended. Two water-tube boilers, two ash-handling plants, economisers, and structural alterations at Stuart Street power station.—John Thompson (Wolverhampton), Ltd.

North Riding.—County Council. Accepted. Overhauling and reconditioning the electrical plant at the Morris Grange Sanatorium (£190).—Chloride Electrical Storage Co., Ltd.

Stirling.—Corporation. Accepted. Electrical work at the Drip Road housing scheme.—A. Brewster.

Forthcoming Events

Electrical Power Engineers' Association (Southern Division).—Saturday, October 1st. Holborn Restaurant, W.C. 5.30 for 6 p.m. Annual dinner and dance.

Institution of Heating and Ventilating Engineers.—Tuesday, October 4th. Home Office Industrial Museum, Westminster, S.W.1. 6.45 p.m. "The Measurement in Relation to Human Comfort of Radiation Produced by Various Heating Systems." Dr. H. M. Vernon.

Rugby Engineering Society.—Wednesday, October 5th. Rugby. Presidential address. Dr. F. W. Carter.

Edinburgh Electrical Society.—Wednesday, October 5th. Philosophical Institution, Edinburgh. 8 p.m. Presidential address. "Some Notes on Domestic Water Heating." Mr. J. Bousie.

Institution of Production Engineers (*London Section*).—Friday, October 7th. Society of Motor Manufacturers' and Traders' Building, London. 7.30 p.m. "Factory Lighting." Mr. A. E. Iliffe.

Notes

The Institution's Programme

The 1932-33 session of the Institution of Electrical Engineers opens on October 20th, when Prof. E. W. Marchant will deliver his presidential address. The following papers will be read during the first half of the session:—November 3rd: "The Electric Lighting of Buildings," by Mr. A. B. Read and Dr. J. W. T. Walsh. November 17th: "The Inland Telegraph Service—The Introduction of Modern machinery and Methods," by Mr. R. P. Smith. December 1st: "The Relative Fuel Economy of Electricity, Gas, Oil and Solid Fuel as Heating Agents," by Mr. A. H. Barker. December 15th: "Post-War Developments in High-Pressure Boilers," by Messrs. C. H. Davy and C. H. Sparks (joint meeting with the Institution of Mechanical Engineers and the Institute of Fuel). January 5th: "The Economic Problems of the Swedish State Railway Electrification," by Mr. I. Ofverholm.

A bust of Michael Faraday, which was recently presented to the Munich Museum by Capt. J. M. Donaldson, on behalf of the Institution of Electrical Engineers

Newcastle Co-operative Society's New Building

New premises for the Newcastle Co-operative Society have recently been opened in which particular attention has been paid to the illumination of the various departments. The public store floors consist of basement, ground floor, and first floor.

On the ground floor the fittings are of the panel type, the metalwork being enamelled blue and the glassware satin finished rimpled; they are 4 ft. 6 in. square. The fittings in the basement and the first floor measure 4 ft. square, the smaller measurement being due to the fact that the ceiling is lower. In these two floors the fittings are most effective and give a diffused light. In addition to the ceiling fittings, panel brackets on the four sides of the stanchions have been fitted; they give even illumination and considerably add to the effect. The same design of bracket is used on the main staircase, with a panelled fitting on each of the lift landings.

The second floor, on which the offices are situated, is also provided with panel fittings for the public space, while the actual offices are provided with enclosed units, incorporating "Radiolite" glassware. On the third floor, where the two small and one main cafés are situated, the decorative fittings take the form of octagonal panelled fittings of bronze metalwork with amber "Styppolite" glassware, and there are brackets in keeping, giving an underlight of rich and yet restful illumination in harmony with the architect's decorative scheme. The higher intensity of lighting demanded in modern stores, which has a very marked physiological influence on the purchasing public, is evidenced in this, one of the finest and largest stores in Newcastle.

The whole of the lighting fittings and the shop window lighting equipment were manufactured and supplied by Messrs. Falk, Stadelmann & Co., Ltd., to a scheme drawn up by the company under the direction of and in collaboration with the Co-operative Wholesale Society's chief architect at the London office, Mr. L. G. Ekins, F.R.I.B.A., and carried out by the Society's Engineering Department at Newcastle, under the supervision of Mr. J. E. Davison, chief engineer. Messrs. Falk, Stadelmann also supplied a large proportion of the electrical installation equipment. Illustrations of the building and the installation appear on page 465.

Triode Regulators

We omitted to mention in the article bearing the above title which we published last week that the matter in its original form appeared in the *Electrotechnische Zeitschrift*.

A Useful Broadcasting Chart

With the October 7th issue of the *Wireless World* a broadcasting station identification chart is being presented. This will provide listeners with an accurate and permanent record of the dial settings of their receivers for every important foreign station. In addition, this special "New Readers' Number" will contain a number of articles of assistance to the beginner in wireless as well as to the older hands.

Neon Lighting at the London Pavilion

The "Claudegen" animated neon sign at the Pavilion Theatre, Piccadilly, W., designed by Claude-General Neon Lights, Ltd., is claimed to be the largest neon sign in Great Britain. On the Piccadilly elevation the two phases of the flashing show the words "Non-Stop Variety" in 8-ft. double outline red neon letters, dancing and juggling turns, and the announcement "1s. to 5s." The whole is surrounded by a sunlight border which is the first exterior installation of its kind in this country. On the Shaftesbury Avenue elevation there is an announcement reading "The World's Greatest Stars in Non-Stop Variety," the letters forming the last three words being 7 ft. high; in this setting there is also a shooting star and trailing lights.

On each of the three corners of the Pavilion, high up on the parapet, is installed a sign to read "London Pavilion" in red neon, with a line of green neon following the line of the parapet and gables, linking up the two big displays and practically surrounding the whole theatre, which stands on an island site. The lower part of the building, the windows, and advertisement boards are outlined in green neon, while the large canopy on the Piccadilly elevation is also in green. Altogether, over 120 transformers are used, the consumption being approximately 35 to 40 kWh per hour.

Educational

The prospectus of the University courses for the 1932-33 session at the Municipal College of Technology, Manchester, is now available and copies may be obtained on application to the Principal.

Details are now also available of the new session of the University College Faculty of Engineering, Gower Street, W.C.1. Prospectuses may be obtained from the secretary.

Midland Electrical Engineers' Ball

The Midland Electrical Engineers' Ball will be held in the Grosvenor Rooms at the Grand Hotel, Birmingham, on November 18th. Early application is requested for tickets, which can be obtained from any committee member. The hon. secretary is Mr. W. Y. Anderson, 14, Dale End, Birmingham.

The N.E.S.C.O.E. Association

We are informed by Mr. W. G. Bass, hon. secretary of the N.E.S.C.O.E. Association, that membership of that body is growing rapidly. He asks all former staff men of the North-East Coast Power Companies, who have not already done so, to communicate with him as early as possible at 506, Bush House, Strand, W.C.2.

Sheffield's New City Hall

In connection with the article on "Sheffield's New City Hall" in our last issue Messrs. Johnson & Phillips, Ltd., inform us that the building is wired throughout with "J. & P." cables supplied through the electrical contractors, Messrs. Grierson, Ltd.

Appointments Vacant

Charge engineer for Canterbury Electricity Department.

Boiler house superintendent for Croydon Electricity Department.

Assistant shift engineer for Hull Electricity Department.

Meter repairer and tester for Mexborough Electricity Department.

Meter mechanic and tester for Harwich Electricity Department.

(See our advertisement pages to-day.)

The Physical and Optical Societies

At a special general meeting of the Optical Society held at the Imperial College of Science and Technology, South Kensington, on September 22nd, the Society was formally dissolved. This was the final step in the process of amalgamation of the Society with the Physical Society of London, which has already made the necessary changes in its constitution. The joint societies will be known as the Physical Society, and the first meeting of the new session will be held on October 7th at the Imperial College of Science and Technology, when Dr. J. W. French, F.Inst.P., will lecture on "The Manufacture of Optical Glass."

All-British Houses

The Incorporated Association of Architects and Surveyors have issued awards of 50, 20 and 10 guineas respectively to successful competitors in their open architectural competition for a design for a £1,000 house employing all-British building materials. The entries numbered 371, and they came from all parts of the world. Designs submitted will be on view to the public (free admission), from October 3rd to 22nd, at the Association's premises, 1, Wilbraham Place, Sloane St., S.W.1, from 10 a.m. to 8 p.m.

Institute of Patent Agents

The Jubilee dinner of the Chartered Institute of Patent Agents will be held on October 26th at the Hotel Victoria, Northumberland Avenue, W.C., at 6.45 for 7 p.m.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

STELLA chromium plating solution.
WITCHAN patent T-slot cable suspenders.
BERVOX loud speakers.
APEX car battery tester.
SELAUB dynamic control regulators.
REINECKE recording instruments.
METEOR electric lamps.
TRIUMPH rotary rectifier.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. A. C. Cramb, director and secretary of British Electrical Development Association, was the guest of the E.D.A. Northern Ireland Area Committee at a luncheon held in Belfast on September 23rd. Sir Crawford M'Cullagh (Lord Mayor of Belfast), in proposing the toast of the E.D.A., paid tributes to Mr. Cramb and to **Mr. F. H. Whysall,** the city electrical engineer. He stated that the output of electricity in Belfast had doubled during the past five years.

Mr. W. A. Prescott, B.E. (Syd.), A.M.I.E.E., A.M.I.E.A., of Sydney, is at present paying his first visit to England for sixteen years. He has been very actively engaged in electrical industrial and other affairs in Australia for a lengthy period. Mr. Prescott served an apprenticeship course with the British Westinghouse Company at Trafford Park, Manchester. For many years he was manager of the electrical department of N. Guthridge, Ltd., in Sydney, representing Bruce, Peebles & Co., Ltd., Johnson & Phillips, Ltd., and George Ellison, Ltd. He subsequently became a partner in the firm of A. N. Macnicol & Co., consulting engineers, Sydney, and during this partnership he had charge of the electrification of a number of Australian country towns. Later, Mr. Prescott reverted to commercial engineering, and for seven years he was in charge of the Industrial Department of the Australian Westinghouse Electric Company, Ltd. This connection ceased quite recently, and he is in this country with a view to arranging for the representation in Australia of companies and firms engaged in electrical and general engineering and allied lines. Readers will have gathered from recent events that the prospects of electrical and general revival in Australia are now much brighter than they have been for some time past, and manufacturers who wish to discuss the situation and the question of representation with Mr. Prescott can do so by getting into touch with him, care of the Bank of New South Wales, 29, Threadneedle Street, E.C.2, which will be his address for the next two months.

Mr. W. A. Prescott

Mr. R. E. Parry, of the staff of the Leigh Corporation Electricity Department, was married at Wigan on September 10th to Miss Edith M. Baucher, of Lyncroft, Wigan.

Mr. B. W. Harding has been appointed commercial assistant in Bromley (Kent) Corporation Electricity Department.

Mr. N. Davidson, who has been awarded the Swan Memorial Scholarship

Mr. N. Davison, who, as reported in our last issue, has been awarded the Swan Memorial Scholarship by the Institution of Electrical Engineers, is employed by the Sunderland Forge & Engineering Co., Ltd. He obtained his B.Sc. degree with second-class honours in June. He will study at the Imperial College of Science and Technology, London.

Mr. W. L. Taylor, who for fifteen years has been in charge of the telephone engineers in the Newbury district, has been appointed chief inspector at Swansea, and has been presented by his colleagues with a wrist watch, a loud speaker, and a pipe and pouch.

Mr. L. A. Ingram, an electrical engineer with the Lewes Electric Light Co., was married on September 17th to Miss E. A. White. He received an oak clock from his colleagues.

Ald. James Scott, M.I.E.E., of Liverpool, consulting electrical engineer to the Formby Urban District Council, the West Lancashire Rural District Council, and several townships in Northern Ireland, has accepted an invitation to be the next mayor of Bootle. Mr. Scott was the chairman of the Bootle Electricity Committee before the Corporation's electricity undertaking was taken over by the Liverpool Corporation, and is now one of Bootle's representatives on the Liverpool Electricity Committee and the Clarence Dock Power Station Sub-committee. At the present time he is preparing a large electrical scheme for West Africa.

Brigadier-General Wade Hayes has joined the board and has been elected deputy-chairman of the Greater London & Counties Trust, Ltd., the £23,000,000 public utility enterprise, which controls a large number of electricity supply companies throughout Great Britain. General Hayes, who is well known in British and U.S. business circles, has represented important international banking interests in Europe during the past five years. He has played a prominent part in the financing of public utility undertakings in England, France, Italy, Germany and Poland since the War. During the War General Hayes was a member of General Pershing's personal staff, and later served on the American Mission to the Peace Conference in Paris.

Brig.-Gen. Wade Hayes

Mr. F. Seddon, of the control staff of the Shropshire, Worcestershire and Staffs Electric Power Co., was married recently at Poolstock to Miss Mary Corless, of Poolstock.

Mr. H. Binns, general manager of the Keighley Corporation Tramways Department (which some time ago substituted electric railless cars and motor buses for trams), recently received a presentation from the inside staff. Mr. Binns is relinquishing the management under an agreement between the Keighley Corporation and the West Yorkshire Road Car Co., Ltd., for the joint running of the Keighley district services. He is to take up an appointment with the Road Car Co. at Leeds.

Mr. S. R. Windle, borough electrical engineer of Grimsby, the extensions to whose works are described in this issue, has been the chief electrical engineer there since May, 1928. He was previously in charge of the Doncaster electricity undertaking for eight years, during which period plant extensions were carried out, and were only just completed before he took over the management at Grimsby. Prior to his Doncaster appointment he was for about ten years chief assistant to Mr. A. S. Blackman, general manager of the Sunderland electricity undertaking. During the past 4½ years 117 route miles of cables have been laid in Grimsby, and about thirty new substations have been provided. The returns of electricity sold from the beginning of the current financial year (April last) to the end of August show a substantial advance over last year, and Mr. Windle anticipates that a total of between 28 and 29 million kWh will be sold during the year, which will mean that the output will have been doubled in five years.

Mr. S. R. Windle, borough electrical engineer, Grimsby

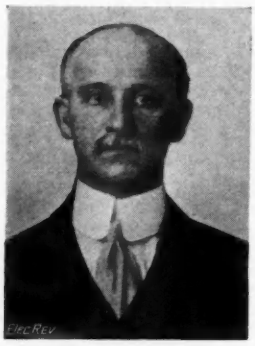
Obituary

Dr. F. H. Hatch.—The death is reported of Dr. Frederick Henry Hatch, O.B.E., past-president of the Institution of Mining and Metallurgy, which occurred in London on September 23rd at the age of 68.

Mr. John Campbell, a service engineer with the Grampian Electricity Supply Co., received a fatal electric shock at Kinloch Rannoch on September 19th. He was working on a 25-ft. pole in effecting connection with the transmission line, and it is thought that one of his arms came into contact with a live wire.

Mr. Andrew D. Young, engineer superintendent at Bo'ness Electricity Works, died suddenly on September 20th in the Edinburgh Royal Infirmary. Since the introduction of electricity to Bo'ness twenty-nine years ago Mr. Young had held a responsible position in the undertaking. He was sixty-two years of age.

M. Paul Bergeron.—The death is reported from Grenoble, France, as the result of a motor accident, of M. Paul Bergeron, the assistant director of the Grenoble Electrotechnical Institute. He was fiftv-two years of age.



The late Mr. John Elliott

Mr. J. Elliott. — Power stations and industrial engineers in many parts of the country will learn with regret that Mr. John Elliott, manager of the Condenser Department of Messrs. Worthington-Simpson, Ltd., passed away after a brief illness on September 19th at Whitley Bay, Northumberland; he was 65 years of age. Mr. Elliott was originally sales engineer with the Blake-Knowles Company in London. He joined the Worthington Pump Company about the year 1904, and had been manager of the Condenser Department for the last 24 years. He served on the Condenser Tube Corrosion Committee of the British Non-Ferrous Metals Research Association.

Mr. O. S. Phillpotts.—The death is reported in *The Times* of Mr. Owen Surtees Phillpotts, which occurred in Vienna on September 21st at the age of sixty-one. Mr. Phillpotts was British Commercial Commissioner in Vienna from 1919 until last spring.

Mr. G. B. Burrows.—We regret to announce the sudden death at Blackpool of Mr. George B. Burrows, A.M.I.E.E., of Preston Corporation, who until recently was a member of the staff of Mr. J. A. Robertson, consulting engineer.

Mr. F. G. Helyer.—The death is announced at the age of 51 years of Mr. Frederick George Helyer, who for twenty years had been on the Postal Telegraphs Superintending Engineers' staff at Croydon, and was previously at Portsmouth with the National Telephone Co.

Wills.—Mr. C. J. Pegley, the late managing director of the Vac-Tric Vacuum Cleaner Factory, left £14,096 (net personalty £12,425).

Mr. H. E. Ashdown, principal and director of H. E. Ashdown (Birmingham), Ltd., left £5,541 (net personalty £4,838).

Mr. George Howard, of Hove, medical electrician, left £10,875 (net personalty £4,636).

Mr. Thomas C. Stewart, former managing director of Stewarts & Lloyds, Ltd., left £106,491 (net personalty £106,044).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Botolph Radio, Ltd.—Private company. Registered September 14th. Capital £500 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of and dealers in wireless, television, and electrical apparatus, &c. The subscribers are: H. M. Westcott, 119, Bishopsgate, E.C.2; and Miss S. Sannett, 153, Commercial Street, E.1. Solicitors: Seaton & Co., Spencer House, E.C.2.

Cosmo Manufacturing, Ltd.—Private company. Registered September 19th. Capital £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless transmitting and receiving sets, component parts and accessories, gramophones, electrical apparatus, &c., and to adopt an agreement with L. Hammerson. The subscribers are: L. D. Hammerson and Leonora Hammerson, both of 246, Barking Road, E.13. L. D. Hammerson is permanent managing director. Acting secretary: T. H. Williams.

Marlborough Radio Co., Ltd.—Private company. Registered September 21st. Capital £2,500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless receiving and transmitting and television apparatus, &c. The subscribers are: E. Pickup, 4, Vicarage Avenue, Padiham; and J. C. Radcliffe, 82, Burlington Avenue, Oldham. Secretary: J. C. Radcliffe.

Spence (Contracting), Ltd.—Private company. Registered September 22nd. Capital £500 in £1 shares. Objects: To acquire from R. H. Spence & Co., Ltd., the business of electrical contractors carried on at 9, Station Road, Egham, and to adopt four agreements, two with R. H. Spence & Co., Ltd., and two with D. E. Green. The subscribers are: D. E. Green, Haslemere, Carshalton Road, Sutton, Surrey; and R. H. Spence, 9, Station Road, Egham. Secretary: D. E. Green.

C. S. Gould & Co., Ltd.—Private company. Registered September 22nd. Capital £1,000 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of, agents for and dealers in all kinds of musical, radio, television and sound recording or producing instruments, &c. The permanent directors are: M. J. Webb (chairman) and Mrs. H. A. F. Webb, both of 77, Ellerton Road, Wandsworth Common, S.W.18.

Philco Southern Distributors, Ltd.—Private company. Registered September 23rd with a nominal capital of £2,000 in £1 shares. Objects: To carry on the business of wholesale dealers in wireless goods, apparatus, sets and accessories, electrical fittings and apparatus, refrigerators, &c. The first directors are: J. J. Baker, "Meadow Bank," Bath Road, Maidenhead; and E. S. Baker, Eldon Street House, Eldon Street, E.C.2. Registered office: Eldon Street House, E.C.2.

McLeod & McLeod, Ltd.—Private company. Registered September 26th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers and repairers of and dealers in dynamos, motors, armatures, magnetos, batteries, conductors, insulators, &c. The subscribers are: Gladys L. Durien, 32, Church Road, Leyton, E.10, and Freida C. Hawking, 15, Devereux Court, Strand, W.C.2. Registered office: 317, High Holborn, W.C.1.

Sellers of Leeds, Ltd.—Private company. Registered September 26th. Capital, £12,000 in £1 shares (4,000 6 per cent. non-cumulative preference and 8,000 ordinary). Objects: To acquire the business of a radio dealer and engineer and electrician carried on by H. W. Sellers at Standard Buildings, City Square, Leeds, as "Sellers of Leeds." The directors are: H. W. Sellers and Mrs. E. M. Sellers, both of Gledholt, Weetwood Lane, Leeds. Solicitors: Stephenson & Moxon, 39, Albion Street, Leeds.

Eric Spencer, Ltd.—Private company. Registered September 21st. Capital, £250 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in radio and electrical goods of all kinds, &c., and to acquire the business carried on at West Bromwich as T. E. F. Spencer. The provisional directors are: T. E. F. Spencer, 24, Nicholls Street, West Bromwich, and J. E. Horton, 86, Paradise Street, West Bromwich. Registered office: 40a, Paradise Street, West Bromwich.

Norman Johnson, Ltd.—Private company. Registered September 24th. Capital, £500 in £1 shares. Objects: To acquire the business now carried on at 358, Lordship Lane, Tottenham, as "N. Johnson," and to carry on the business of makers and repairers of and dealers in apparatus in connection with television, radio telegraphy, telephony, &c. The permanent directors are: N. Johnson, 358, Lordship Lane, Tottenham, N.17, and E. A. Daniel, 30, Vallance Road, Alexandra Park, N. Registered office: 5, Bath Place, Worthing, Sussex.

Returns of Electrical Companies

Simpsons Electricals, Ltd.—Particulars filed of £3,000 debentures authorised September 8th, charged on the company's property, including uncalled capital, the amount of the present issue being £1,000. Issue on September 20th of £2,000 debentures, part of a series already registered.

Flinders (Wholesale), Ltd.—Issue on September 15th of £7,500 debentures, part of a series already registered.

Davies, Kent & Stewart, Ltd.—Particulars filed of debentures for £1,350 (inclusive of £1,050 previously registered), authorised July 26th, 1904, charged on company's undertaking and property, present and future, including any uncalled capital, the amount of the present issue (September 9th, 1932) being £300.

Halford Radio, Ltd.—Deed dated September 13th, to secure £844 and further advances, charged on company's undertaking and property, present and future, including uncalled capital. Holders: Levetus, Ltd., 194, Bishopsgate, E.C.

W. J. Butler & Co., Ltd.—J. S. B. Hole, 240, High Holborn, W.C.1, was appointed receiver and manager on September 12th, under powers contained in instrument dated August 20th, 1932.

Moreland Electric Welding Co., Ltd.—Capital, £4,000 in £1 shares. Return dated October 8th, 1931 (filed April 20th, 1932). 2,302 shares taken up. £2,202 paid. £100 calls unpaid. Mortgages and charges, nil.

City of London Electric Lighting Co., Ltd.—Capital, £2,400,000 in 400,000 6 per cent. first preference, 300,000 8 per cent. second preference, 1,600,000 ordinary, and 100,000 unclassified shares of £1 each. Return dated April 6th, 1932. 400,000 first preference, 300,000 second preference, and 1,200,000 ordinary shares taken up. £1,500,000 paid on the first and second preference and 800,000 ordinary shares. £400,000 considered as paid on 400,000 ordinary shares. Mortgages and charges, £985,570.

Electrical Power Fitting Co., Ltd.—Capital, £500 in £1 shares. Return dated April 5th, 1932. 305 shares taken up. £218 3s. 10d. paid, leaving £86 16s. 2d. in arrears. Mortgages and charges, nil.

Radio House, Ltd.—Capital, £1,000 in £1 shares. Return dated October 23rd, 1931 (filed May 6th, 1932). All shares taken up. £1,000 paid. Mortgages and charges, nil.

Rooke Bros., Ltd.—Particulars filed of £1,300 second debentures (inclusive of £500 already registered), authorised by resolutions of July 1st, 1932, and September 2nd, 1932, charged on the company's undertaking and property, present and future, including uncalled capital (subject to first debentures), the amount of the present issue being £800.

Gambrell Bros., Ltd.—The nominal capital of the company has been increased by the addition of £5,000 beyond the registered capital of £10,000. The additional capital is divided into 5,000 6 per cent. cumulative non-redeemable preference shares of £1 each.

Rose & Partridge, Ltd.—Second debenture dated September 1st, to secure £250, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: R. C. Watson, 30, Bedford Row, W.C.1.

City Notes

The Insull Companies.—The New York correspondent of *The Times* reports that two of the companies which once made up the "Insull Empire" of Middle Western public utility enterprises have been taken out of the hands of receivers by a Federal Judge in Chicago and put into bankruptcy. They are the Insull Utility Investments, Inc., which recently showed a deficit of about $225,000,000, and the Corporation Securities Co., which at one time valued its assets at $140,000,000. The receivers for the latter reported to the Court that they had found "bales and bales of worthless securities" in the company's treasury, and nothing that could be turned into cash except $30,000 worth of tax anticipation warrants. The State Attorney in Chicago has disclosed the names of 250 persons and firms who had been allowed under an agreement with Mr. Samuel Insull in 1929 to buy Insull Utility Investments, Inc., shares at $12 to an aggregate of 250,000 shares, although in that year the lowest market quotation for the stock was $50 a share, and at once time in 1929 it sold as high as $149. The shares were bought with an agreement that they were to be held for two and a half years or if sold were to be offered to the issuing corporation first at the current market price.

A *Reuter* message from Chicago states that the United States District Attorney has announced that an investigation into the affairs of the Insull utility companies had been started "to determine whether any Federal statutes had been violated." Another investigation has been started by the local county officials, and the State Attorney has ordered an examination into the extradition treaties with France and Canada.

Parker, Winder & Achurch, Ltd., state that the trading for the past six months does not justify the payment of an interim dividend on the ordinary shares. They are hopeful that a more confident undertone, which is at present in evidence, will so materialise as to result in an improvement in the company's trade during the latter half of the current financial year.

Companies to be Struck off the Register.—The names of the undermentioned companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary:—

Advance Radio Co., Ltd.
Ensign Electric Bell & Signal Co., Ltd.
Expert Wireless Services, Ltd.
Kaytonion Electrics, Ltd.
Radio Parts, Ltd.

The Wellman Smith Owen Engineering Corporation, Ltd., reports a net profit for 1931 of £3,017, as compared with £7,662 in the preceding year, which reduces the debit on profit and loss account to £516. Depreciation reserve has been increased to £65,033, the sum of £7,000 having been provided out of the profits for depreciation, and £2,845 has been provided in respect of tax.

The Charing Cross Electricity Supply Co., Ltd., has decided to redeem part of its 4½ per cent. debenture stock. The portions to be redeemed will be decided by lot, and paid off on January 15th, 1933, at £102 per cent., together with accrued interest.

Edgar Allen & Co. announce that it is still necessary to conserve the company's financial resources. They have therefore decided to defer payment of a dividend on the 5 per cent. cumulative preference shares in respect of the half-year ending September 30th.

The Direct Spanish Telegraph Co., Ltd., has decided to pay the usual dividend on the preference shares in respect of the half-year to June 30th, at the rate of 10 per cent. per annum, less tax. Owing to the decline in the company's traffic receipts it is unable to pay an interim dividend on the ordinary shares.

Hopkinsons, Ltd., have declared an interim ordinary dividend of 2½ per cent. (same).

Erinoid, Ltd., has recommended a dividend of 10 per cent., less tax, for the year ended July 31st. This compares with a dividend of 5 per cent. paid a year ago.

The Midland Electric Corporation for Power Distribution, Ltd., has declared an interim ordinary dividend of 2½ per cent. (same).

The Montreal Light, Heat & Power Consolidated has declared a dividend of 37 cents on the common shares for the quarter ending September 30th.

The West London & Provincial Electric & General Trust has announced an interim ordinary dividend of 1½ per cent., less tax (against 2½ per cent.).

The Calgary Power Co. has declared a quarterly dividend of 1½ per cent. on the common stock (same).

Murex, Ltd., has declared a final dividend of 20 per cent. on the ordinary shares, making 35 per cent. for the year (same).

Stocks and Shares

TUESDAY EVENING.

THE last day upon which holders of the 5 per cent. War Loan can assent to the conversion of their stock into the 3½ per cent. security is the Friday in this week, and although the final figures have yet to be published, the success of the operation is now established beyond any question. The French Government has been equally fortunate in the conversion of the Rentes, holders of which were given barely a week in which to make up their minds whether to convert or not. Of the outstanding amount, 99 per cent. has been converted. These are factors which have a bearing upon the gilt-edged and the international markets. Money remains abnormally cheap, which is a bad advertisement, truly enough, for the condition of trade generally, but which for the time being enables big borrowers to arrange their finances on a very easy basis. No further concession has been made by the Government in connection with lifting the ban imposed upon new issues. The number daily increases of appeals for capital that are going to be made as soon as the word is given for prospectuses to appear.

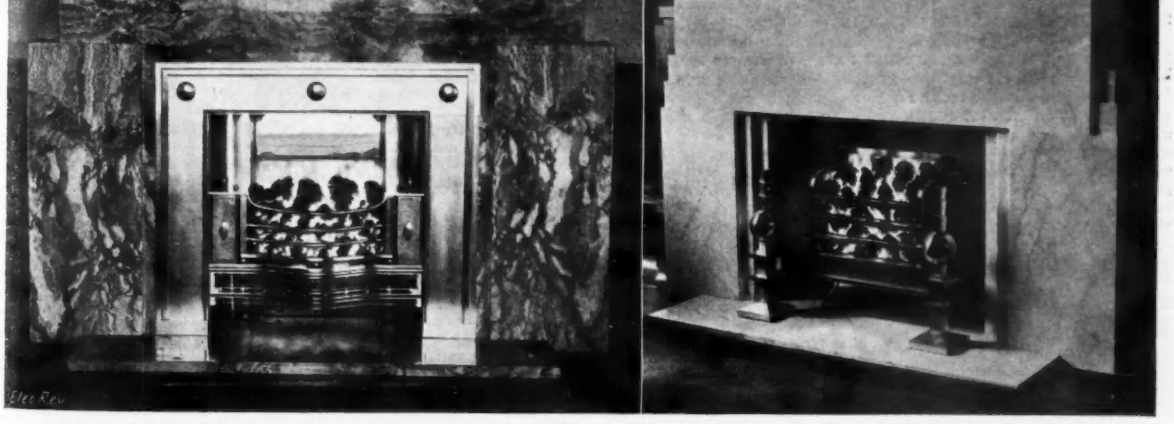
Home Railway Stocks

Settlement of the threatened strike of busmen led to a recovery in the price of Underground Electric ordinary shares to 18s. 0d. What the compromise actually means to the company and to the men is not entirely clear yet. The results will depend upon the way in which the speeding-up plan works out in practice. Some, at any rate, of the men think that it will lead to some of the present 'buses being taken off the streets. Metropolitan ordinary stock is a point lower at 62. The market in the electric railway prior charge-stocks suffered in no way from the possibility of a strike occurring. Their prices have been more under the influence of monetary conditions prevailing in Lombard Street. In a good many cases it is more easy to sell stock than it is to buy it.

Home Electricity Shares

The same condition prevails to a certain extent in the market for Home electricity supply shares. In the London companies' group there is but a scanty amount of stock on offer. Occasionally shares come in; there are, for instance, South Londons available at the present time, the price showing a decline of 6d. on the week at 32s. 6d. Charing Cross ordinary shares are also 6d. down at 31s. 6d. The latter company's 4½ per cent. debenture stock has given way to 102½, on the proposal to redeem part of the issue, and to pay off a portion on January 15th next at 102, plus interest to date. The portion to be redeemed will be decided by lot, and holders of the stock will be notified as soon as the lots have been drawn. Of this stock there is outstanding £641,000. The proposal has caused a certain amount of questioning as to whether other companies may adopt a similar course. The Charing Cross Company has a 4 per cent. first debenture issue of £394,000, the price of which stands at 97½. County of London ordinary show a small gain at 48s. 3d.

In the Provincial list, Newcastle preference are 6d. easier



"Magicoal" fires at Unilever House: These are two examples of many and show how utility and beauty can be combined. The fireplace surrounds were all designed by Sir John Burnet Tait & Lorne in conjunction with Mr. Simpson, architect to Lever Bros. The fire grates, with one exception, were designed and manufactured by Berry's Electric, Ltd.

at 30s. 6d. Hendon ordinary have hardened to 4⅓, and Lancashire Electric 6 per cent. first preference to 32s. 6d.

Dollar Stocks

With a recovery of 10 points, American Telephone and Telegraphs advanced to 166½, and, in sympathy, International Telephones rose to 21. A subsequent reaction lowered the prices to 162½ and 18½ respectively. The New York market in American shares is swaying prices in London, even of stocks and shares which it might be supposed had no connection with the United States. By degrees, however, the London markets are escaping from the American influence which makes itself felt more particularly, of course, in the industrial groups. Of the purely transatlantic shares, Hydro-Electrics have risen to 11¼, Shawinigans at 24 are 1½ up, Power Corporation of Canada at 18 and British Columbia Power "A" shares at 32 show no changes. Mexico Tramways 5 per cent. bonds lost 3½ points of the rise of 13 that they secured last week, the price going back to 40. Pachuca Light and Power 5 per cent. bonds, in the Mexican group, rose 3 to 52½. Brazilian Tractions, after being over 15, went back to 14½, showing a small loss on balance.

Rumours and Reports

For once in a way, the market in electrical equipment and manufacturing shares has been a hub of rumour and gossip. The talk started through a sharp rise which occurred in Johnson & Phillips shares, the shares coming up from a little under 20s. to 26s. 9d., from which there has been a reaction to 23s. 9d. Endeavour to trace the cause for the buying led to talk of a possible rapprochement between Johnson & Phillips and one of the manufacturing companies, of which Callender's seemed to be the most popular for rumour purposes. Not content with this, gossip went on to take an interest in certain possibilities that are said to confront the Enfield Cable Company, and a little speculation sprang up in the shares, the price of which improved to 4⅝. No particular object would be served in referring here to such rumours, were it not for the fluctuations in quotations which they have caused.

Movements in Manufacturing Shares

Henley's have risen to 6, but the 4½ per cent. preference lost the improvement which they gained last week, and reverted to 5. Edison Swan preference are a little better at 23s. 3d. British Aluminium ordinary weakened ⅛ to 23s. 9d, on intimation from the company that the directors had decided to defer consideration of a dividend until the accounts for the full year were ready. Associated Electrical Industries ordinary shares advanced to 19s. 6d. General Electric ordinary at £2 2s. are ⅛ harder on purchases by investors taking the longer view that, in course of time, gilt-edged stocks will decline in price when money stiffens under revived demand from trade and industry, in which revival such leading companies as the General Electric are likely to be amongst the first to share.

Cables and Wireless

Cables & Wireless 5½ per cent. preference is unchanged at 70. The two ordinary stocks, at 23 and 12 for "A" and "B," respectively, are both higher on the week. Business in them is quiet, and speculators seem to be preferring other markets for the time being. Globe Telegraph ordinary and preference failed to recover the reactions which they sustained last week. Western Union stock has dropped to 57½. Amongst the lower-priced shares, Telephone Rentals are a good spot, with a rise to 5s. 6d., it being said that the company is doing very well at the present time, and improving upon the satisfactory results shown in the last report. Telephone Manufacturing shares, on the other hand, have gone back to 4s. 1½d.

Two Stocks on Offer

At the time of writing, there is available in the market a line of £25,000 General Electric 5 per cent. mortgage debenture stock. It is rarely that a block of this nature comes in, and at the price asked, of 107¼ ex dividend, the yield comes to £4 13s. 3d. per cent. Redemption is by drawings at 100, by means of a 1 per cent. cumulative sinking fund now in operation, the latest maturity date being 1967. The company has the right, however, to repay the stock any time up to September, 1937, at 105, from then up to 1947 at 102, and thereafter at par. The risk of having the stock drawn or repaid at 100 can be covered by insurance, several of the leading companies being ready to undertake this class of business for a very small premium, calculated on the price above par at which the stock stands.

A sound 5 per cent. debenture stock of which there is £2,500 available is that of the Bankside Investment Trust, a subsidiary of the City of London Electric Lighting Company. The stock is offered at 115, and the security is that, of course, of the City of London Company. A cumulative sinking fund of £9,000 per annum starts next year, and this can be applied in purchase up to 100, but there are no drawings. The stock is repayable in 1982 at 105. The running yield is £4 7s. per cent.

Rubber Stagnation

The prices of commodities show a disposition to improve, but this is not of sufficient consequence to have any marked effect upon rubber shares. The market in these remains in a stagnant condition. Amongst iron, coal and steel descriptions, Babcock & Wilcox are 9d. lower at 46s. 3d., and the list as a whole shows a slight inclination to dullness, owing to a want of interest on the part of the investor.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price, Sept. 27.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	70/–	—	4 5 9
Brompton Ordinary	1	8½	8½	31/–	–6d.	4 10 4
Central Electricity 4½% Deb.	Stock	4½	4½	103	+½	4 7 4
Charing Cross Ordinary	1	8½	8½	31/6	–6d.	4 9 0
Chelsea	1	8½	8½	31/6	–6d.	4 9 0
City of London	1	10	10	41/3	—	4 16 10
Clyde Valley	1	8	7	31/3	—	4 9 7
County of London	1	11	10½	48/3	+9d.	4 7 5
Edmundsons' 7% Pref.	1	7	7	29/–	—	4 16 7
Elec. Dis. Yorkshire	1	9	9	39/6	—	4 11 1
Elec. Supply Corporation	1	11	11	52/6	—	4 3 10
Kensington Ordinary	1	8	8	32/6	—	4 6 2
Lancs. Light and Power	1	6½	7	28/9	—	4 17 5
London & Home Counties 4½% Deb.	Stock	4½	4½	106½	—	4 4 6
London Electric	1	9	9	32/–	—	4 7 6
Metropolitan	1	10	10	46/3	—	4 6 7
Midland Counties	1	7	7	32/6	—	4 6 2
Mid. Elec. Power	1	8	8	33/9	—	4 14 9
Newcastle-on-Tyne Ordinary	1	6	6	26/3	—	4 11 5
Do. 7% Pref.	1	7	7	31/–	—	4 10 4
Northampton	1	10	10	45/9	—	4 7 4
Notting Hill 6% Pref.	10	6	6	12½	—	4 16 0
North Met. Elec. 6% Pref.	1	6	6	28/–	—	4 5 9
St. James' and Pall Mall	1	8	8	31/–	—	4 10 4
Scottish Power	1	8	—	32/6	—	4 18 6
South London	1	8½	8½	32/6	–6d.	4 6 2
Urban Ordinary	1	7	—	29/6	—	4 15 0
Westminster Ordinary	1	8½	8½	31/6	—	4 9 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	18/9	—	8 0 0
Yorkshire Elec.	1	8	8	38/9	—	4 2 6
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	81½	—	4 18 2
Metropolitan	,,	3½	2½	62	–1	4 0 8
Do. District	,,	5	4½	61½	—	7 6 3
Underground Electric	1	8	7	18/–	+6d.	7 15 7
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	162½	+6	5 10 9
Anglo-Am. Tel. Pref.	Stock	6	6	103½	—	5 16 0
Do. Def.	,,	1½	1½	25½	—	5 17 8
Cables & Wireless 5½% Pref.	,,	5½	2¾	70	—	3 18 7
Do. A 7½% Ord.	,,	—	Nil	23	+1½	—
Do. B ord.	,,	—	Nil	12	+½	—
Globe Tel. and T. Ord.	10	8½	Nil	8½	—	—
Do. do. Pref.	10	6	6	10½	—	5 11 7
Great Northern Tel.	10	20	20	26	—	7 13 10
Marconi-Marine	1	15	10	30/9	—	6 10 1
Oriental Telephone Ord.	1	12	12	2¾	—	*4 7 5
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	—	—	5/–	—	—
Do. do. 2nd Pref.	5	—	—	3/9	—	—
Do. do. 5% Deb.	Stock	—	—	7	—	—
British Electric Traction Def. Ord.	,,	5	5	300	—	—
Do. do. Pref. Ord.	,,	8	8	133½	—	5 19 10
Brazil Traction	100	—	—	14½	–½	—
Brit. Columbia Elec. Rly. Pfe.	Stock	5	5	99½	—	5 0 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	10/–	—	—
London United Tram Deb.	Stock	4	4	62½	+1	6 8 0
Mexico Trams, 5% Bonds	—	5	5	40	–3½	12 10 0
Mexican Light Common	100	Nil	Nil	12½	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	65½	—	7 12 8
Victoria Falls Ord.	1	15	15	75/–	+½	4 0 0
Yorkshire (West Riding)	1	Nil	Nil	5/–	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	6	4	19/6	+9d.	4 2 1
Do. Pref.	1	8	8	30/–	—	5 6 8
Babcock & Wilcox	1	15	14	46/3	–9d.	6 1 3
British Aluminium Ord.	1	10	5	24/6	–⅛	4 1 8
British Insulated Ord.	1	15	15	65/–	—	4 12 4
Brush Ord.	Stock	5	Nil	32	—	—
Callender's	1	15	15	3	+⅛	5 0 0
Do. 6½% Pref.	1	6½	6½	27/6	—	4 14 6
Crompton Parkinson Ord.	5/–	30	24	21/3	—	5 13 0
Do. 8% Pref.	1	8	8	30/–	—	5 6 8
Edison-Swan 1st Pref.	1	7½	7½	23/3	+6d.	6 9 0
Do. 5% Deb.	Stock	5	5	100	—	5 0 0
Electric Construction	1	Nil	Nil	8/9	—	—
Enfield Cable Ord.	1	25	25	4⅝	+⅛	5 16 0
English Electric	1	Nil	Nil	10/9	—	—
Do. do. Pref.	1	Nil	Nil	12/6	—	—
Ever Ready	5/–	35	35	27/6	+6d.	6 7 0
Ferranti Pref.	1	7	7	24/–	–6d.	5 16 8
G.E.C. Pref.	1	6½	6½	28/–	—	4 12 10
Do. ord.	1	10	8	42/–	+⅛	3 16 2
Henley's	1	30	30	6	+⅛	5 0 0
Do. 4½ Pref.	5	4½	4½	5	–½	4 10 0
India-Rubber	1	Nil	Nil	3/9	—	—
Johnson & Phillips	1	10	5	1⅛	+⅛	4 4 2
Siemens Ord.	1	7½	7½	23/3	—	6 9 0
Telegraph Construction	12	Nil	Nil	10¾	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931

5527. "Transformers of the static type." H. G. Nicholson. February 21st, 1931. (379667.)

6738. "Means for electrically producing oscillatory or reciprocatory motion." British Thomson-Houston Co., Ltd., and R. C. Clinker. March 4th, 1931. (379711.)

10338. "Light-signalling arrangements for railways." K. Meyer. April 8th, 1931. (379767.)

12633. "Static electrical transformers." A. Fletcher. April 29th, 1931. (Cognate application 12634/31.) (379685.)

12868. "Generation and modulation of electric oscillations." Communication Patents, Inc. October 17th, 1930. (379718.)

13181. "Process of and apparatus for electrically welding joints or seams by means of an electric arc." Babcock & Wilcox Ltd. (Babcock & Wilcox Co.). May 4th, 1931. (379723.)

15257. "Electric switches and trip gear therefor, particularly applicable to limit switches for use with electrically operated stop valves and the like." E. C. Jones. May 23rd, 1931. (379687.)

15575. "Telephone systems." Associated Telephone & Telegraph Co. May 7th, 1931. (379671.)

15857. "Highly emissive thermionic cathode." Radioakt.-Ges. D. S. Loewe, Dr. H. Benjamin and E. Ehrig. May 31st, 1930. (379702.)

15883. "Two-way electrical signal transmission systems." Electrical Research Products, Inc. June 7th, 1930. (379673.)

15952. "Tuning-coil units." Igranic Electric Co., Ltd., and H. S. Payman. June 1st, 1931. (379729.)

16068. "Manufacture of electric cables." Standard Telephones & Cables, Ltd., and T. R. Scott and J. K. Webb. June 2nd, 1931. (379704.)

16117. "Electric gramophone motors." Royal Motor Akt.-Ges. and A. F. Boitel. June 2nd, 1931. (379706.)

16123. "Voice-operated signal transmission circuits." Electrical Research Products, Inc. June 7th, 1930. (379707.)

16230. "Electronic discharge tubes." Standard Telephones & Cables, Ltd. September 17th, 1930. (379736.)

16281. "Electrically driven pumps." J. Stone & Co., Ltd., and S. C. Davey. June 4th, 1931. (379738.)

16397. "Electro-magnetic automatic contact-breakers." A. Pisk and A. Metzger. June 5th, 1930. (379748.)

16402. "Telephone systems." Associated Telephone & Telegraph Co. July 14th, 1930. (379749.)

16458. "Electric terminal connections particularly intended for use in ignition circuits." North & Sons, Ltd., and A. Massey Allen. June 5th, 1931. (Addition to 346712.) (379753.)

16513. "Radio-receivers." Marconi's Wireless Telegraph Co., Ltd., C. G. Kemp and L. G. Kemp. June 5th, 1931. (379758.)

16677. "Electrical operating and controlling apparatus for bulkhead doors, sluice gates, and the like. J. Stone & Co., Ltd., A. L. Ash and W. P. Watkins. June 8th, 1931. (379772.)

16701. "Electrical distribution systems for distributing music and the like." Marconi International Marine Communication Co., Ltd., and R. W. Piper. June 8th, 1931. (379774.)

16793. "Colour-light signals for railways and the like." General Railway Signal Co. June 23rd, 1930. (379776.)

17694. "Photo-electric devices." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 18th, 1930. (379788.)

18312. "Mercury arc rectifiers." General Electric Co., Ltd., and E. Gallizia. June 24th, 1931. (379794.)

18387. "Plug-and-socket connectors, switches, fuses, and the like." C. L. Arnold and M. K. Electric, Ltd. June 25th, 1931. (379795.)

18409. "High-frequency electrical transmission lines. Marconi's Wireless Telegraph Co., Ltd. June 25th, 1930. (379796.)

18385. "Röntgen-tube holder proof against high tension and radiation." Siemens-Reiniger Veifa Ges. für Medizinische Technik. July 8th, 1930. (379801.)

18918. "Systems of electrical distribution." G. A. Juhlin, E. M. Johnson, and Associated Electrical Industries, Ltd. June 30th, 1931. (379802.)

19155. "Electric power switches." Siemens-Schuckertwerke Akt.-Ges. July 3rd, 1930. (379804.)

19608. "Terminal for electric leads." E. J. Brock. July 7th, 1931. (379810.)

20237. "High-frequency oscillation generators." Marconi's Wireless Telegraph Co., Ltd. July 31st, 1930. (379812.)

20772. "Electric fusible cut-outs." E. Long, J. Bromley, and Long & Crawford, Ltd. July 21st, 1931. (379817.)

20994. "Cathodes for electric discharge devices." C. Stansbury. August 8th, 1930. (379823.)

22217. "Electrical connections." H. H. Berry and W. J. Markham. August 5th, 1931. (379828.)

22428. "Carrier-wave signalling over electric supply wires." Siemens & Halske Akt.-Ges. August 8th, 1930. (379831.)

22621. "Electric fires." H. H. Berry. August 11th, 1931. (379835.)

23397. "Electromagnetic sound recording and reproducing apparatus." O. S. Lieberg and I. E. Losonczi. August 19th, 1931. (379843.)

23484. "Railway signalling-apparatus." British Power Railway Signal Co., Ltd., and H. S. Knox. August 20th, 1931. (379846.)

23718. "Means for amplifying the currents of photo-electric cells." E. Falkenthal. August 26th, 1930. (379849.)

24099. "Gates or control devices for electric switches and the like." Hopkinsons, Ltd., R. A. Hopkinson, and W. B. Dale. August 27th, 1931. (379853.)

24136. "Incandescent lamps." Egyesult Izzolampa es Villa Mossagi Reszventarsasag. August 28th, 1930. (379854.)

25136. "Electric clock system for vehicles moved transversely to the meridian lines, more especially for ships." Landis & Gyr. Soc. Anon. September 8th, 1930. (379859.)

25198. "Voltage-absorbing resistance for use with radio apparatus." A. F. Bulgin. September 8th, 1931. (379861.)

25640. "Electric irons and stands therefor." A. Morgan and H. Cakelbergh. September 12th, 1931. (379864.)

25888. "Electric switches with arc extinction by the action of self-generated vapour." Siemens-Schuckertwerke Akt.-Ges. September 22nd, 1930. (379869.)

25915. "Motor-car headlamps." R. Wood. September 16th, 1931. (379870.)

26777. "Water heaters, more particularly electric water heaters." H. H. Berry and C. A. Painton. September 25th, 1931. (379879.)

27129. "Methods of hermetically sealing electric conductors into vitreous vessels." International General Electric Co., Inc. September 30th, 1930. (379883.)

28006. "Electric discharge devices." British Thomson-Houston Co., Ltd. October 8th, 1930. (379889.)

28552. "Photo-electric devices." Naamlooze Vennootschap Philips Gloeilampenfabrieken. December 6th, 1930. (Addition to 379788.) (379893.)

28850. "Railway signalling systems." British Thomson-Houston Co., Ltd. October 16th, 1930. (379896.)

28964. "Multi-position electric switches." E. V. A. Willett. October 19th, 1931. (379897.)

29800. "Method of making groups of insulated electric conductors." Siemens Schuckertwerke Akt.-Ges. November 1st, 1930. (379901.)

30021. "Systems of picture transmission." British Thomson-Houston Co., Ltd. October 31st, 1930. (379905.)

31586. "Automatic volume controlled amplification systems." Marconi's Wireless Telegraph Co., Ltd. November 26th, 1930. (379916.)

31889. "Insulating material for electric conductors." International General Electric Co., Inc. November 17th, 1930. (379918.)

32359. "Device for preventing variation in the speed of the electrons in the case of Braun tubes." M. Von Ardenne. November 22nd, 1930. (379923.)

32699. "Electric switches or circuit-breakers." British Thomson-Houston Co., Ltd. November 25th, 1930. (Addition to 377707.) (379924.)

33236. "Electric ignition systems." R. Bosch Akt.-Ges. December 18th, 1930. (379927.)

34015. "Tanks or reservoirs for feeding oil or fluid insulating compound to electric cables." Soc. Italiana Pirelli. December 10th, 1930. (379936.)

34641. "Commutators for dynamo-electric machines." A. O. Hinchliff. December 14th, 1931. (379940.)

34712. "Electric cables carrying high-tension currents." Felten & Guilleaume Carlswerk Akt.-Ges. December 15th, 1930. (379941.)

36013. "Head-lamps for automobile vehicles." G. J. Laurent and L. Robiquet. October 2nd, 1931. (379949.)

36114. "Impedance bonds for railway systems." General Railway Signal Co. January 16th, 1931. (379950.)

1932

824. "Thermionic valve circuits." Telefunken Ges. für Drahtlose Telegraphie. January 9th, 1931. (379957.)

1287. "Sparking-plugs for air-cooled internal-combustion engines." A. Kegresse. July 29th, 1930. (Divided application on 21577/31.) (379963.)

2475. "Use of loud speakers in electric signalling devices." Ideal Werke Akt.-Ges. für Drahtlose Telephonie. February 24th, 1931. (379971.)

2869. "Thermionic amplifiers." Marconi's Wireless Telegraph Co., Ltd. February 20th, 1931. (379974.)

3759. "Cables for use for feeding radio and other high-frequency electrical energy." Telefunken Ges. für Drahtlose Telegraphie Ges. February 7th, 1931. (379976.)

6474. "Luminous electric discharge tubes." General Electric Co., Inc. April 15th, 1931. (379991.)

7211. "Electric gas blast switches." International General Electric Co., Inc. March 10th, 1931. (379996.)

10614. "Electric motor control systems." British Thomson-Houston Co., Ltd. April 17th, 1931. (380014.)

11653. "Thermionic amplifiers." Revelation Patents Holding Co. April 28th, 1931. (380024.)

12519. "Indirectly heated cathodes for discharge devices." Janaer Glaswerk Schott & Gen. May 5th, 1931. (380025.)

15295. "Devices for lighting streets." Naamlooze Vennootschap Philips Gloeilampenfabrieken. June 5th, 1931. (380,033.)

18903. "Cable-sheathing presses." Felten & Guilleaume Carlswerk Akt.-Ges. July 3rd, 1931. (380037.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 21st:—

Martian. No. 533756. Class 8. Radio-telephonic apparatus, radio-gramophones, &c., and parts of such goods.—A. G. Clark, 43, Wellington Road, St. John's Wood, N.W.8.

Berec. Nos. 534118 and 534119. All goods in Classes 11 and 13.—Every Ready Co. (Great Britain), Ltd., Hercules Place, Holloway, N.7.

Escolite. No. 534225, and Escolux No. 534226. Class 15. Glass.—Edison Swan Electric Co., Ltd., 123-125, Queen Victoria Street, E.C.4.

Astrinite. No. 533141. Class 50. Plastic moulding compositions made principally of bitumen or asphalt.—General Plastics Corporation, Ltd., Morden Hill, Lewisham, S.E.13.

Silicosis and Asbestosis

A Memorandum on "The Industrial Diseases of Silicosis and Asbestosis" has been issued by the Home Office (Stationery Office, 3d. net). Its chief interest to the electrical industry lies in the emphasis placed on the value of good exhaust ventilation, which implies an opportunity for the manufacturers of induced-draught fans. The Memorandum states that "respirators can never be regarded as a substitute for exhaust ventilation."

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Improvements at the Corporation swimming baths; city architect.

Annfield Plain.—Houses (82), West Kyo; J. W. Elliott, U.D.C. surveyor, Council Offices.

Aylesbury (BUCKS).—Works extensions, Mandeville Road, for the Bifurcated & Tubular Rivet Co., Ltd. Rebuilding business stores, High Street, for David Greig, Ltd., 145, Waterloo Road, London, S.E.

Ayr.—Refuse destructor works (£7,000); burgh surveyor.

Batley (YORKS).—Model dairy for the Co-operative Society; C. F. Moxon, architect, 3, Regent Street South, Barnsley.

Becontree (ESSEX).—St. Alban's Church, L.C.C. housing estate (£9,000); Bishop of Chelmsford.

Bembridge (I.o.W.).—Rebuilding Eastcliffe Mansion for Earl Fitzwilliam.

Bexhill-on-Sea.—Houses (20), Camperdown Street, Sidley, for D. J. Williams. Estate development for P. Glessing, Chestnut Walk, Little Common; J. E. Maynard, architect. Development of Collington Manor Park Estate; Thompson & Walker.

Billericay (ESSEX).—Houses (24); R.D.C. surveyor.

Blaydon-on-Tyne.—Public swimming baths; T. Mastaglio, U.D.C. surveyor, Council Offices.

Boston.—Houses (30), Kirton; R.D.C. surveyor.

Bristol.—Extensions to Ham Green Hospital (£55,000); city engineer.

Burnley.—Extension of Grammar School (£2,000); clerk to the governors.

Bury.—Houses (150), Huntley Brook and Huntley Fold Estates; borough engineer.

Chester.—School (450 places), Lache Estate; C. Greenwood, city surveyor, Council Offices.

Chester-le-Street.—Houses; M. Wilson, R.D.C. surveyor, Union Offices.

Christchurch (HANTS).—Housing scheme; borough surveyor.

Clayton (MANCHESTER).—Leather works, Bank Street, for Whittle Bros.

Cleator Moor (CUMBERLAND).—Wesleyan church (£3,500); trustees' secretary.

Cleobury Mortimer (WORCESTERSHIRE).—Houses (20), Highley Public Construction Co., builders, Swindon.

Clitheroe.—Fire station; borough surveyor.

Congleton.—Public baths (£10,000); borough surveyor.

Coulsdon (SURREY).—Joinery works, Chipstead Valley Road, for Messrs. Ingram.

Coventry.—Cinema, Old Leicester Road; Matterson, Huxley and Watson, Ltd., engineers, Cross Cheaping.

Crewe.—Clinic and child welfare centre (£7,000); borough surveyor.

Croydon.—Houses (31), Chartham Road; Steel & Howes, Farnley Road. Houses, Ham Farm Estate (90) and Waddon Estate (181); borough engineer. Bank premises, London Road; J. Smith & Son, Ltd., South Norwood.

Dalbeattie.—Houses (20) for the T.C.; Purdon Smith, architect.

Darlington.—Houses (122), Hundens Lane; E. Minors, borough engineer, Town Hall.

Deal.—School for the Borough E.C.; director of education.

Denton (MANCHESTER).—Extensions to works, Felt Street, for Lancashire Felt Co., Ltd.; Thorpe & Collier, 66A, Deansgate, Manchester.

Dorchester. — Reconstruction and enlargement, Palace Theatre, for Albany Ward Theatres, Ltd.

Erpingham (NORFOLK).—Houses (22) for the R.D.C.; J. Beckett, builder, Hindolvestone.

Essington (WOLVERHAMPTON).—Church of St. John the Evangelist; J. & F. Wootton, Ltd., builders, Bloxwich.

Eston (YORKS).—Estate development, Normanby; Mr. Knowles.

Failsworth (NEAR MANCHESTER).—Extension to St. Chad's Church, New Moston (£2,250); Rev. W. R. Bullock, incumbent, 10, Parkhurst Avenue, New Moston.

Faringdon (BERKS).—Houses (64); E. H. Bradley & Sons, builders, Swindon, Wilts.

Greenwich.—Houses (55), St. Germans Estate, for Sykes and Pomfret; Lincoln, Darby & Co., 8, Park Place, Eltham.

Hawarden.—Houses (20), with electrical work, Caergwrle; H. Wycherley & Co., builders, Moss, Wrexham.

Holme Cultram (CUMBERLAND).—Extensions to Carr's Flour Mills; H. E. Scarborough, architect, Lowther Street, Carlisle.

Ince (LANCS).—Housing scheme, Platt Bridge; U.D.C. surveyor.

Irish Free State (CORK).—Houses (100); E. Barrett, builder, Douglas Road. Houses (150); Meagher & Heyes, builders. (THURLES, Co. TIPPERARY).—Houses (38), Derheen; T. C. Courtney, town surveyor. (Co. WESTMEATH).—Technical school, Athlone, for the Vocational E.C.; O. Doyle, architect, c/o Surveyor's House, Courthouse, Athlone.

Kilmarnock.—Greyhound race-course, Ayr Road; J. Connelly and Alexander Paterson, 6, Herbert Street, Glasgow.

London.—(CAMDEN TOWN).—Rebuilding of Royal Veterinary College; governors. (LONDON, E.1).—R.C. school, Commercial Road district; Rev. Canon T. Ring, rector of SS. Michael and All Angels, 340, Commercial Road, E.1. (POPLAR).—Additions to premises of Pinchin, Johnson & Co., Ltd., Wharf Road; J. E. Jenkins, 36, Queen Anne's Gate, S.W.1. Extensions, Blondon Street, for Muir & Weir; Bishop Bros., Fairfield Road, E.3. (TOTTENHAM).—Factory extension, Park View Road; House Property & Investment Co.

Manchester.—Milk depôt, Beresford Road and Buller Road, Longsight; E. Fielding, Architects' Dept., Manchester & Salford Equitable Co-operative Society, Ltd., Downing Street.

Middlesbrough.—Houses (160); S. E. Burgess, borough engineer, Town Hall. Elementary school (900 places), Emmerson; S. Moffett, director of education.

Newcastle-on-Tyne.—Houses (198), Ferguson's Lane, for the Corporation; R. Barron & Co., Ltd., builders, Coundon. Houses (68), Heaton Hall Estate; W. E. Hall & Sons, builders, 29, Durham Road, Gateshead. Houses on the north side of Welbeck Road, for the C.C.; R. E. Roberts, architect, 18, Cloth Market.

Northfleet.—Building estate, Wombwell Park; D. Kenn and Sons, Ltd.

Nottinghamshire. — Tuberculosis dispensary, Mansfield; county architect, Nottingham.

Orrell (LANCS).—Houses (98); Clough & Gaskell, builders.

Pontefract.—Houses (100), for the T.C.; F. Haslam & Co., builders, Doncaster.

Preston.—Post Office, Fishergate; H.M. Office of Works, King Charles Street, S.W.1.

Prestwich.—Church of St. Gabriel, Sedgley Park; Rev. Brian Willett, St. Gabriel's Vicarage.

Ravensthorpe (YORKS).—Houses (130), Ravensthorpe Gardens Housing Estate; H. Brearley, architect, Westfield, Syke Lane, Earlsheaton, Dewsbury.

Rawtenstall.—Houses (23), New Road, Waterfoot; J. Edmondson.

Reading.—Telephone exchange, Earley, for H.M. Office of Works, King Charles Street, S.W.1.

Romford.—School, L.C.C. housing estate (£50,500); director of education.

St. Helens (LANCS).—Estate development, off Fleet Lane, for C. Morris.

Saltburn (YORKS).—Houses for aged people, Marske and Saltburn; U.D.C. surveyor, Council Offices.

Selby (YORKS).—Extensions, Memorial Hospital (£4,000); J. H. Carr & Sons, builders.

Shirley (SURREY).—Houses (70), Shirley Way; J. Crock & Son, Ltd., 33, Streatham Place, S.W.2.

Slough.—Memorial hall (£4,996); E. & C. Bowyer, architects; W. Gradwell & Co., Ltd., builders.

Southend-on-Sea.—Bazaar stores, Leigh Broadway, for F. W. Woolworth & Co., Ltd., London.

South Shields.—Business premises, Salem Street, for H. Binns, Ltd.; Carruthers & Sons, builders. Store and garage, Thames Street; F. W. Newby, architect, 37, King Street.

Staffordshire.—Admission hospitals and convalescent blocks, Burntwood and Cheddleton Mental Institutions; Mental Hospitals Board.

Stirling.—Houses (200); burgh surveyor.

Stockton-on-Tees.—Houses (162), Sunderland Glebe Estate, for the T.C. (£47,000); S. Coates, builder, Middlesbrough. Schools, Hartburn and Newnham; J. P. Wakeford, borough engineer, Town Hall.

Sunderland.—Alterations to Binns premises, and conversion of premises, Clifton Villas, into training college for teachers (£12,000); Randle & Co., builders, Back Dunelm Street.

Tynemouth.—Houses in Balkwell Lane; W. Stockdale, architect, 73, Howard Street, North Shields. Houses (220), Silkey's Lane, and school (720 places) on the Chinton Farm Estate; J. L. Beckett, borough engineer, Town Hall. Additions to ice factory for Shields Ice & Cold Storage Co., Ltd., Brewhouse Bank; A. K. Tasker, architect.

Upholland (LANCS).—Houses (62); U.D.C. surveyor.

Wallasey.—Four shops, Pasture Road (£2,349); Bennett Bros.

Walsall.—Houses (50); borough surveyor.

Warrington.—Elementary school (150 places), Bewsey, for the Rev. J. Aldred Clarke; Wright & Hamlyn, architects, Winmarleigh Street.

Warsop (NOTTS).—Houses; U.D.C. surveyor.

Waslington (DURHAM).—Houses (24), Heworth Road; Ball & Thomas, builders, Norton-on-Tees.

Weston-super-Mare.—Houses (28), Bournville Estate, U.D.C. surveyor. Nurses' home, Hospital Board of Management; secretary.

Whitley Bay (NORTHUMBERLAND).—Pier; Oliver & Roberts, engineers, 6, Broad Street Place, E.C.2.

Wolverhampton.—Pavilion and play fields, Nine Elms Lane (£5,500); borough engineer. Premises, Princess Street and King Street; South Staffs Permanent Building Society. Alterations to St. Mark's schools, Humber Road; managers. Extensions to Emmanuel Church, Goresbrook Road; Rev. E. W. Goodman.

Worcester.—Houses (34); city surveyor.

Wrexham.—Houses, Spring Lodge Estate (200), and Acton Park Estate (22), for the T.C.; Lockwood, Abercrombie & Saxon, architects, Cathedral Chambers, Chester.

Yeovil.—Labour hall (£3,000), with electrical work; Bird & Pippard, builders.

A Large All-welded Construction

The new airship hangar, at Sunnyvale, California, which is to house the new U.S. Navy dirigible "Macon," will be approximately 1,200 ft. in length, 308 ft. in width, and 225 ft. high, and will have a floor area of 300,000 sq. ft. It will be the largest building in the world without supporting pillars. The sheet-steel mezzanine floors which run the entire length of the building, one on each side, consist of 2 ft. by 12 ft. steel plates 3/16 in. thick, welded together. The splices between the ends of the plates are welded butt-strap joints, as are the longitudinal joints, but the top flange of supporting 3-in. I-beams for the latter serve as the strap. The 3-in. I-beams are in turn welded to 20-in. I-beams. All the welds of the floor plates are continuous and the floor plate welds are ground flush with the top surface after the welds are completed.